جامعة قطر
QATAR UNIVERSITY

OPERATION AND MAINTENANCE WORKERS SAFETY

April 2011

Operations and Maintenance Workers Safety Policy and Guidelines

All information herein is applicable to staff, visitors, and contractors involved in the operations and maintenance of Qatar University. Any request for amendment of this policy shall be forwarded in writing to the Office of the Director, Business Operations Department.

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1.0 STATEMENT OF POLICY

A safe, healthful work environment is one of the elements to have a successful operation and maintenance implementation. Qatar University believes that safety of everybody is a shared responsibility between employer and workers.

In the interest to improve the General Safety practices, we shall provide the whole campus facilities free of health and safety hazards. To accomplish this, Qatar University shall comply with all occupational safety, health and environmental laws mandated by the state, and relevant international standards and regulations.

To prevent accident and incident in the QU campus that may result to injuries of employees, operations and maintenance contractors, damage to property and equipment, Business Operation Department – Safety Unit shall provide guidelines and shall require compliance with safety regulations and procedures. In turn, each person is ultimately responsible for personal safety, and shall follow safety and health policies and procedures, exercise caution in the performance of his/her duties, use normal safe working practices, observe and obey safety postings and rules, use and maintain personal protective equipment when needed and approved, and promptly report all accidents to the appropriate government and school authorities.

2.0 SCOPE AND APPLICATION

The primary objective of this policy is to protect the health and well being of all employees, faculties, students and visitors of the University by:

- Eliminating and preventing accidents and injuries;
- Instituting adequate procedures to protect all property from loss and damage due to accidents;
- Assuring that all employees, faculties and students clearly understand the risks that directly affect them in the performance of their respective responsibilities;
- Requiring all employees, faculties and students to be in compliance with all safety regulations and procedures;
- Reducing, controlling, or avoiding employee and faculty exposure to all known or suspected occupational health and safety risks;
- Establishing and maintaining communication with all employees and faculties to keep them aware of the safety and health factors related to their jobs; and
- Maintaining an effective emergency preparedness and response procedures.

3. GUIDELINES

The Operation and Maintenance Workers Safety Policy shall provide guidelines which describe the minimum level of safe practices and requirements that are expected from all individuals (faculty, staff, and Contractors) involved in the operations and operation of Qatar University Equipment facilities.

3.1 Hazard Management

The Contractor/s will use hazard management for identifying, assessing, mitigating and controlling hazards in their respective work area.

3.1.1 Definitions

Hazard - source or situation with potential for harm in terms of human injury or ill health, damage to property, damage to the workplace environment, or a combination of these.

Risk - combination of the likelihood and consequence (s) of a specified hazardous event occurring.

3.1.2 Hazard identification

Hazard identification is the process of identifying hazards in the workplace or for a work procedure. In order to understand what hazard identification involves, it is first necessary to understand the nature of hazards.

Identify hazards through:

- Walk through surveys
- Inspection checklists
- Past records
- Accident investigation
- Consultation
- Documentation
- Job safety analysis

3.1.3 Risk Assessment

Risk assessment is the process of assessing all of the risks associated with each of the hazards identified during the hazard identification process.
In assessing the risks, three essential steps are taken:

- The probability or likelihood of an incident occurring is evaluated.
- The severity of the potential consequences is calculated or estimated.
- Based on these two factors, the risks are assigned priority for risk control through the use of a risk rating.

Risk assessment involves examining and evaluating the likelihood and severity (or consequence) of the potential outcomes in order to prioritize risks for control.

3.1.4 Risk Control

Risk control provides a means by which risks can be systematically evaluated against a set of control options (the hierarchy of controls) to determine the most effective control method(s) for the risk(s) associated with each hazard. This process involves analyzing the data collected during the hazard identification and risk assessment processes, and developing a strategic plan to control the risks identified.

The risk control process starts by considering the highest ranked risks, working down to the least significant. Each risk should be examined having regard to the "hierarchy of controls". This provides a method of systematically evaluating each risk to determine, firstly, if the causal hazard can be eliminated and otherwise, to find the most effective control method for each risk.

The "Hierarchy of Controls" shall be used at all times when implementing controls to eliminate the hazard or reduce the risk of a hazard causing loss at the University.

The hierarchy of controls is as follows:

- Eliminate the hazard.
- Substitute with a lesser hazard.
- Use engineering controls to reduce hazard.
- Administrative controls such as workplace procedures.

- Personal Protective Equipment.

In many cases, it will be necessary to use more than one control method. Back-up controls (such as personal protective equipment and administrative controls) should only be used as a last resort or as a support to other control measures.

3.1.5 Evaluation

Monitoring and review is the final stage in the process. It is the means by which risk management is kept current and effective, as new hazards and those overlooked in the original process are identified and controlled.

Monitoring and review involves the systematic re-implementation of the original safety program steps of hazard identification, risk assessment and risk control

This is to ensure that the process was undertaken properly and that, in hindsight, the conclusions were correct.

Contractor shall prepare the risk assessment of all activities in the respective work area, reviewed and approved by QU Safety Unit.

The following Risk Assessment tools/ forms shall be used for hazard and risk assessment:

Appendix 1 – Hazard Assessment Matrix
Appendix 2 - Risk Assessment Form
Appendix 3 - Risk Assessment Listed and Review Dates
Appendix 4 - Work Equipment Assessment

3.2 Personal Protective Equipment

Provision for new or additional Personal Protective Equipment shall be the responsibility of the contractor. QU BOD Safety Unit has the right to require the contractor/s to issue/ re-issue new Personal Protective Equipment if it is deem necessary due to work requirements.

3.2.1 Head Protection.

- Workers must wear protective helmets when working in areas where there is a potential for injury to the head from employee initiated impact or impact from falling or other moving objects.
- Protective helmets designed to reduce electrical shock hazards will be worn by each worker when near exposed electrical conductors which could contact the head. Helmets will comply with ANSI Z89.1-1986 or be equally effective.
- Class C head protection shall be used for protection from minor scalp abrasion and minor bump hazards. Class B head protection shall be used for electrical hazard. Class A head protection shall be used for construction.
- Head protection shall be replaced if cranked, chopped or otherwise damaged.
- Employees and contractors shall not paint or deface hard hat or bump cap.
- Each employee and contractor shall be issued one head protection according to usage.
- Employees, contractors and visitors shall wear head protection on the following areas: construction site, central service unit, men's and women's

activity, energy center those areas when working requires lifting and excavation.
- Operation and Maintenance contractors shall wear head protection at all times while working.

3.2.2 Eye and Face Protection.

- Use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.
- Eye and Face PPE must comply with ANSI Z87.1-1989 or be demonstrated to be equally effective.
- Contractors/ workers shall wear approved eye protection at work site where protection to the eyes is needed (e.g. welding, grinding, cooling tower monitoring, laboratory analysis, chipping, polishing, lathe turning work).
- Safety glasses shall be furnished contractor to his/her employees.
- Eye and face protection that are already blurred and damaged shall be replaced immediately.
- Eye and Face Protection shall comply with Occupational Safety and Health Standard 1910.133 and passed ANSI Z87.1-1989 and/or EN-166.

3.2.2.1 Safety Glasses

- Do not use ordinary prescription as they no provide adequate protection from injury to the eyes.
- Use hardened-glass or plastic spectacles with side shield.

- Safety glasses use must comply with the Standard for Occupational and Educational Eye and Face Protection (Z87.1).
- Wearing of contact lenses is allowable provided only if wearing additional eye protection.

3.2.2.2 Goggles

Wear goggles when there is a hazard from splashing chemicals or flying particles, e. g. when using glassware under reduced or elevated pressure, or using glass apparatus in combustion or other high temperature operations.

3.2.2.3 Face Shields

- Wear face shield when there is a need for greater protection from flying particles and harmful liquids to protect face and neck.
- Consider using a face shield when operating a vacuum system (which may implode), or conducting a reaction with potential for mild explosions.

3.2.3 Hand Protection.

- Use appropriate hand protection when their hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns and harmful temperature extremes.
- Supervisors must base the selection of hand protection on evaluation of the performance characteristics of the hand protection relative to the

specific tasks to be performed, conditions present, duration of use and the hazards and potential hazards identified.

- Employees, students, and contractors shall wear hand protection when exposed to potential hand injuries and minimize exposure to hazards such as chemical absorption through the skin, severe lacerations or cut, punctures and chemical or thermal burn.
- Employees, students and contractors shall use protective leather gloves for cutting and welding work.
- The Material Safety Data Sheet shall be used to determine the appropriate gloves to be used during handling of chemicals.
- Contractors working with rigging wire and chains shall use cotton work gloves.
- Employees, students and contractors shall maintain (clean, safe keep) the hand protection equipment to maximize useful life.
- Hand Protection shall comply with Occupational Health and Safety Standard 1910.138 and passed European Standard EN-388.

3.2.3.1 Gloves

- Wear proper protective gloves for potential contact with corrosive or toxic material, materials of unknown toxicity, sharp edged object, and very hot or cold materials.
- Select gloves based on material handled, the particular hazard involved and their suitability for the operation conducted.
- Consider double gloving (the wearing of two gloves on each hand) when handling highly toxic or carcinogenic materials.
- Before each use, inspect gloves for discoloration, punctures and tears.
- Before removal, wash gloves if the material is impermeable to water.
- Do not reuse single-use disposable gloves.
- Store gloves properly.
- Dispose gloves if already old; shelf life is stamped on the box.
- Dispose contaminated gloves in the proper waste bin.
- Do not wear gloves outside the working area as this may contaminate surface if touch such as doorknobs, elevator buttons or rest fixtures.
- Do not use gloves containing asbestos for high temperature operation, use synthetic material such as Kevlar.

3.2.3.2 Electrical Gloves

- Defective insulating gloves shall not be used.
- Insulating gloves with the following defects shall not be worn: holes; tears; punctures or cuts; imbedded foreign objects; texture changes such as swelling, hardening or becoming stick or inflexible.
- Rubber insulating gloves that have been used without protectors shall not be used without protective gloves.
- Protective gloves shall not be used if they have holes, tears or other defects that affect their ability to give mechanical protection to the insulating glove.
- Protective gloves shall not be used if they have holes, tears or other defects that affect their ability to give mechanical protection to the insulating glove.
- Protective gloves that have been used for any other purpose shall not be used to protect insulating gloves.

- Gloves that have been rejected and are not suitable for electrical services shall have the fingers removed and the gloves disposed.
- Rubber gloves and protective gloves which have oil, grease or other damaging substance on them, shall be cleaned properly before use.
- Rubber gloves shall be turned inside out and rinsed as necessary to remove perspiration. Excess water shall be removed by shaking and the gloves shall be air-dried.
- Insulating gloves shall be visually inspected by the wearer for defects. Before using, visually inspect the glove especially around the fingers to detect cracks or deterioration.
- Insulating gloves shall be given an air test by rolling the cuffs tightly toward the palm in such a manner that air is trapped inside the gloves or by using a mechanical inflator. When using the latter care shall be taken to avoid over-inflation.
- Gloves shall be air tested each day before use and time there is cause to suspect damage.
- A periodic inspection of the gloves shall be conducted by the Electrical Engineer to determine that such equipment is being maintained in a satisfactory condition by the user.
- Gloves shall be stored in a designated location (e.g. tool room) as cool, dark and dry as possible with no other material or equipment nearby that could cause damage.
- Gloves when not in use must be inside the protectors and in a bag, box or container designed for and used exclusively for them. These gloves shall be stored in their natural shape.
- The protector gloves shall be sized and shaped so the insulating gloves shall not be deformed from their natural shape.
- Electrical gloves shall comply with Occupational Health and Safety Standard 1910.137.

3.2.4 Protective Apparel/ Coverall (Long Sleeve)

- Coverall or protective aprons shall be worn at all times in while working.
- Wearing loose (e.g. saris, dangling neckties, oversized or ragged coats) in the working area is prohibited.
- It is strictly prohibited to strap the coverall in the waist line portion of the body as this does not served the purpose of protecting the half portion of the body.
- Cover-all shall be worn during operation, maintenance of equipment. Shirt and pants shall be worn for other operational duties and light maintenance.
- Trouser legs shall not be rolled above the ankles and shirttails shall be tacked in one's pants.
- Clothing saturated with oil shall be removed as soon as practical and the affected part of the body shall be washed with soap and water.
- Only clean clothing in good condition (free of tears, frays, rips and patches) shall be worn during work.
- Finger rings, watches, bracelets and other jewelry shall be removed while performing maintenance work.
- Wear cover-all under welding aprons and chaps during welding work. Button cover-all to the neck and button pockets to prevent sparks and slag from burning the skin. Do not use clothing to clean torch tips.
- Cover-all shall be worn by contractors at all times during his work at the University.

3.2.5 Respiratory Protection

- Employees will wear appropriate respiratory protection when adequate ventilation or substitution with non-toxic chemicals, etc., is not possible or feasible. Respirator protection must comply with ANSI Z288.2.
- Respiratory protection is necessary when working with highly toxic chemicals, biological hazards, or dust known to cause asthma or pulmonary fibrosis. However, respirators are a "last line" of defense, and should not be used until all engineering controls (e.g. ventilation) and work practice controls are exhausted.
- Respirators to be use shall comply with Respiratory Protection Standard OSHA 29 CFR 1910.134.
- Do not use "comfort masks" or surgical masks.
- Respirator shall be used while working at chemicals with toxic fumes.
- Respirator shall be used during construction where dust accumulation is very heavy.
- Respirator shall be used in confined spaces.
- Refer to Material Safety Data Sheet (MSDS) for proper selection of respirator.
- Respirator fit shall be conducted annually for employees required to wear respirator.
- Employees with facial hair shall not be given mask respirator as the gas will still penetrate the sealing surface of the respirator.
- Contact lenses shall not be used with respirator.
- Respirator shall be inspected before and after use by employee for tightness of connections; condition of face piece; head band; valves and connecting tubes, pliability and signs of deterioration of rubber parts; proper air pressure and proper functioning.
- Clean and disinfect equipment after each use according to manufacturer recommendation.
- Positive pressure respirator shall be serviced only by experienced person using parts designed for the particular respirator.
- Respirator shall be stored where they are protected from dust, sunlight, heat, extreme cold, excessive moisture and damaging chemicals. Store respirator with the face piece and exhalation valve resting in a normal position to prevent distortion. Do not store respirator in places, such as lockers or toolboxes, unless they are in carrying cases or cartons supplied by the manufacturer.
- Chemical cartridges shall be replaced as necessary to provide complete protection.
- Replacement of cartridge shall be installed by experienced personnel. Change a defective respirator for a new one.
- Respirator located at stations and work areas for emergency use shall be readily accessible at all times. They shall be stored in a specially designed compartment.
- Respirator shall comply with Occupational Safety and Health Standard 1910.134

3.2.6 Fall Protection.

- Fall protection must be provided when employees are exposed to:
    - a vertical fall of ten feet or more over a lower level or
    - any height over dangerous equipment.
- Fall protection will consist of either passive or active fall protection. Fall protection must comply with ANSI A10.14-1991.

- Safety harness shall be worn at all times while working above 1.8 meters or more above ground unless other adequate protection against falling is provided.
- All safety harness shall be regularly inspected for excessive wear or damage that could cause them to fail. Harnesses and lanyards that are worn or damaged to the extent that they could fail shall be discarded and not be used.
- Safety harness or lanyards shall be a minimum of 13 mm nylon or the equivalent, with a maximum length of 1.8 meter. They shall have a minimum breaking strength of 2,700 kg.
- Lifelines shall be a minimum of 20 mm, or equivalent, with a minimum breaking strength of 2,700 kg. Steel cables are recommended for horizontal anchor lines with a minimum breaking strength of 2,700 kg or five times the load.
- Fall protection equipment shall comply with Occupational Health and Safety Standard 1926.104 and passed European Standard EN-361, EN-354, EN-355, EN-353-2 and EN-362.

3.2.7 Foot Protection

- Employees must wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or from object piercing the sole, and where employees' feet are exposed to electrical hazards. PPE for foot protection must comply with ANSI Z41.1991 or be equally effective.
- Workers shall wear employer issued safety shoes at work site at all times. Exceptions are as follows: offices, meeting rooms, change rooms. Avoid borrowing safety shoes.
- Each employee's shall wear protective footwear when working in areas where there is danger of foot injuries due to falling or rolling piercing the sole, or where the feet are exposed to electrical, chemical hazards.
- Shoes with toe or metal guards, oil and chemical resistant sole shall be used as foot protection.
- If safety shoes are inadvertently destroyed as a result of assigned duties (but not caused by employee's negligence) safety shoes shall be replaced at company's expense.
- Contractual workers working inside the University premises shall wear foot protection, provided by the contractors.
- Visitors shall wear foot protection at areas that require safety shoes and shall be provided by the University and/ or contractors.
- Safety shoes shall comply with Occupational Health and Safety Standard 1910.136 and passed ANSI Z41-1991 and/or European Standard EN-345.

3.2.8 Electrical Protection

Electrical protective equipment such as insulating blankets, mating, covers, line hoses, gloves, gloves and sleeves must be provided to employees who are exposed to electrical hazards.

3.3 Electrical Safety

Equipment and electronic systems must conform to the National Electric Code, National Fire Protection Association Code (NFPA) 70E and KAHRAMAA requirements. Compliance must be adjudicated by licensed electricians or duly trained personnel.

Electrically powered equipment is essential elements of many facilities such as substation area, distribution board/ pane, switch gear room, etc. These devices can pose a significant hazard to workers, particularly when mishandled or not maintained.

Many electrical devices have high voltage or high power requirements, carrying even more risk. Large capacitors found in many systems are capable of storing lethal amounts of electrical energy and pose a serious danger even if the power source has been disconnected.

3.3.1 Electrical Hazards

The major hazards associated with electricity are electrical shock and fire. Hazards include burn, faulty electrical discharge, electrocution and overloading due to “octopus” connection using multi receptacle outlet adaptor. Electrical shock occurs when the body becomes part of the electric circuit, either when an individual comes in contact with both wires of an electrical circuit, one wire of an energized circuit and the ground, or a metallic part that has become energized by contact with an electrical conductor.

Electricity travels in a closed circuit, normally through a conductor. Shock results when the body becomes part of the electrical circuit; current enters the body at one point and leaves at another. Typically, shock occurs when a person contacts.

The severity and effects of an electrical shock depend on a number of factors, such as the pathway through the body, the amount of current and the length of time of the exposure. Other factors that may affect the severity of the shock are the voltage of the current, presence of moisture in the environment, the phase of the heart cycle when the shock occurs, the general health of the person prior to the shock.

Conductor is a substance with very little resistance to the flow of electrical current. Water is a great conductor of electricity, allowing current to flow more easily in wet conditions and through wet skin.

The effect of the shock may range from a slight tingle to severe burns to cardiac arrest. The chart below shows the general relationship between the degree of injury and amount of current for a 60-cycle hand-to-foot path of one second's duration of shock. While reading this chart, keep in mind that most electrical circuits can provide, under normal conditions, up to 20,000 milliamperes of current flow.

Current	Reaction
1 Milliampere	Perception level
5 Milliamperes	Slight shock felt; not painful but disturbing
6-30 Milliamperes	Painful shock; "let-go" range
50-150 Milliamperes	Extreme pain, respiratory arrest, severe muscular contraction
1000-4,300 Milliamperes	Ventricular fibrillation
10,000+ Milliamperes	Cardiac arrest, severe burns and probable death

In addition to the electrical shock hazards, sparks from electrical equipment can serve as an ignition source for flammable or explosive vapors or combustible materials.

In addition to the electrical shock hazards, sparks from electrical equipment can serve as an ignition source for flammable or explosive vapors or combustible materials.

3.3.2 Preventing Electrical Hazards

There are various ways of protecting people from the hazards caused by electricity, including insulation, guarding, grounding, and electrical protective devices. Workers/ Electricians can significantly reduce electrical hazards by following some basic precautions:

- Electrician shall be a competent person.
- Use double-insulated tools.
- Ground all exposed metal parts of equipment.
- Use all equipment according to the manufacturer's instructions.
- Do not modify cords or use them incorrectly.
- Inspect wiring of equipment before each use. Replace damaged or frayed electrical cords immediately.
- Use safe work practices every time electrical equipment is used.
- Know the location and how to operate shut-off switches and/or circuit breaker panels. Use these devices to shut off equipment in the event of a fire or electrocution.
- Limit the use of extension cords. Use only for temporary operations and then only for short periods of time. In all other cases, request installation of a new electrical outlet.
- Multi-plug adapters must have circuit breakers or fuses.
- Place exposed electrical conductors (such as those sometimes used with electrophoresis devices) behind shields.
- Minimize the potential for water or chemical spills on or near electrical equipment.
- Electrical equipment, tools, cords, and usage are to be in full compliance with National Fire Protection Association (NFPA) 70E.

3.3.3 Insulation

Insulator is a substance with such a high resistance that they can be used to prevent the flow of electrical current. All electrical cords should have sufficient insulation to prevent direct contact with wires. In a laboratory, it is particularly important to check all cords before each use, since corrosive chemicals or solvents may erode the insulation.

Damaged cords should be repaired or taken out of service immediately, especially in wet environments such as cold rooms and near water baths.

Insulations shall conform to QCS 2007 Electrical Standards.

3.3.4 Guarding

Live parts of electric equipment operating at 50 volts or more must be guarded against accidental contact. Plexiglas shields may be used to protect against exposed live parts.

3.3.5 Grounding

Ground – refers to a conductive body, usually earth. "Grounding" a tool or electrical system intentionally creating a low resistance path to the earth. When properly done, current from a short or from lightning follows this path, thus preventing the build up of voltages that would otherwise result in electrical shock, injury and even death.

System or service ground – a wire called “the neutral conductor” is grounded at the transformer, and again at the service entrance of the building. This is primarily designed to protect machines, tools and insulation against damage.

Equipment ground is intended to offer enhanced protection to the workers themselves. If a malfunction causes the metal frame of a tool to become energized, the equipment ground provides another path for the current to flow through the tool to the ground.

Only equipment with three-prong plugs should be used in the laboratory. The third prong provides a path to ground for internal electrical short circuits, thereby protecting the user from a potential electrical shock.

3.3.6 Circuit Protection Devices

Circuit protection devices are designed to automatically limit or shut off the flow of electricity in the event of a ground-fault, overload or short circuit in the wiring system. Ground-fault circuit interrupters, circuit breakers and fuses are three well-known examples of such devices.

Fuses and circuit breakers prevent over-heating of wires and components that might otherwise create fire hazards. They disconnect the circuit when it becomes overloaded. This overload protection is very useful for equipment that is left on for extended periods of time.

The ground-fault circuit interrupter, or GFCI, is designed to shutoff electric power if a ground fault is detected, protecting the user from a potential electrical shock. The GFCI is particularly useful near sinks and wet locations. Since GFCIs can cause equipment to shutdown unexpectedly, they may not be appropriate for certain apparatus. Portable GFCI adapters (available in most safety supply catalogs) may be used with a non-GFCI outlet.

3.3.7 Motors

Motor-driven electrical equipment should be equipped with non-sparking induction motors or air motors. These motors must meet National Electric Safety Code, NFPA 70E, Class 1, Division 2, Group C-D explosion resistance specifications and/or QCS 2007 Electrical Standards.

Avoid series-wound motors, such as those generally found in some vacuum pumps, rotary evaporators and stirrers. Series-wound motors are also usually found in household appliances such as blenders, mixers, vacuum cleaners and power drills. These appliances should not be used unless flammable vapors are adequately controlled.

Although some newer equipment has spark-free induction motors, the on-off switches and speed controls may be able to produce a spark when they are adjusted because they have exposed contacts. One solution is to remove any switches located on the device and insert a switch on the cord near the plug end.

3.3.8 Guidelines on Safe Work Practices

The following practices may reduce risk of injury or fire when working with electrical equipment:

- Avoid contact with energized electrical circuits.

- Disconnect the power source before servicing or repairing electrical equipment.
- When it is necessary to handle equipment that is plugged in, be sure hands are dry and, when possible, wear nonconductive gloves and shoes with insulated soles.
- If it is safe to do so, work with only one hand, keeping the other hand at your side or in your pocket, away from all conductive material. This precaution reduces the likelihood of accidents that result in current passing through the chest cavity.
- Minimize the use of electrical equipment in cold rooms or other areas where condensation is likely. If equipment must be used in such areas, mount the equipment on a wall or vertical panel.
- If water or a chemical is spilled onto equipment, shut off power at the main switch or circuit breaker and unplug the equipment.
- If an individual comes in contact with a live electrical conductor, do not touch the equipment, cord or person. Disconnect the power source from the circuit breaker or pull out the plug using a leather belt.
- Post known hazards such as “high voltage”, “high temperature”, “possible shock”, “wear protective equipment”, etc.
- Repairs of high voltage or high current equipment should be performed only by trained electricians.
- Before employees and contractors may be exposed to or work on or near live parts or circuits they must be de-energized unless the employer can demonstrate that de-energizing introduces additional or increased hazards or is unfeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.
- f the exposed live parts are not de-energized (i.e., for reasons of increased or additional hazards or unfeasibility), other safety related work practices shall be used to protect employees and contractors who may be exposed to the electrical hazards involved. Such work practices shall protect employees and contractors against contact with energized circuit parts directly with any part of their body or through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts
- Employees and contractors working on de-energized parts or near enough to them to expose the employee to any electrical hazard they present, must follow the following safety work practices:

    - Conductors and parts of electric equipment that have been de-energized but have not been properly locked out or tagged out shall be treated as energized.
    - While any employee and contractor are exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged out or both.

- The following procedures shall be followed for de-energizing equipment:

    - Safe procedures for de-energizing circuits and equipment shall be determined before circuits or equipment are de-energized.
    - The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.

- Stored electrical energy which might endanger personnel is released such as discharging capacitors and short-circuiting and grounding high capacitance elements, if the stored electrical energy might endanger personnel. If the capacitors or associated equipment are handled in meeting this requirement they are treated as energized.
- Stored non-electrical energy (hydraulic, pneumatic, etc.) in devices that could re-energize electric circuit parts shall be blocked or relieved to the extent that the circuit parts cannot be accidentally energized by the device.

- Application of Locks and Tags (see 4.1.4 **Lock Out / Tag Out System**).
- The following requirements shall be met before any circuit or equipment is considered de-energized or worked on as de-energized.

  - A qualified person operates the equipment, operating controls or otherwise verifies that the equipment cannot be restarted.
  - A qualified person uses test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and verifies that the circuit elements and equipment parts are de-energized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been de-energized and presumed to be safe. When voltage over 600 volts, nominal are tested the test equipment shall be checked for proper operation immediately before and immediately after the test.

- The following requirements shall be met, in the order given, before circuits or equipment is re-energized, even temporarily.

  - A qualified person conducts test and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds and other such devices have been removed, so that circuits and equipment can be safely energized.
  - Employees and contractors exposed to the hazards associated with re-energizing the circuit or equipment shall be warned to stay clear of circuits and equipment.
  - Each lock and tag shall be removed by the employee who applied it or under his or her direct supervision. However, if the person is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that the supervisor ensures the person who applied the lock or tag is not available at the workplace, ensures that the employee is aware that his or her tag has been removed before he or she resumes work at that workplace, and a visual determination is made to ensure that all people are clear of the circuits and equipment.

- Only qualified persons may work on electric circuit parts or equipment that have not been de-energized. The qualified person shall be capable of working safely on energized circuits and shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.
- When work is to be performed near overhead lines, the lines shall be de-energized and grounded or other protective measures shall be provided before work is started. If the lines are to be de-energized, arrangements shall be made with the electric utility company, person or organization that operates or controls the electric circuits involved to de-energize and

ground them. If protective measures, such as guarding, isolating, or insulating, are to be provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment. Only qualified persons of the electric utility, power transmission and distribution organizations are allowed to install insulating devices on overhead power transmission and distribution lines.

- Employees and contractors shall not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely. Employees and contractors are not to perform tasks on or near exposed energized parts where there is a lack of illumination or an obstruction which precludes observation of work to be performed.
- For confined or enclosed work spaces, prior to entry employees and contractors must be trained in the confined space entry requirements. For employees and contractors working in confined or enclosed spaces such as manholes or vaults that contain exposed energized parts, they shall be provide with protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels and the like shall be secured to prevent their swinging into an employee and causing the employee and contractor to contact exposed energized parts.
- Conductive materials or equipment that is in contact with any part of an employee's or contractor's body shall be handled in a manner that will prevent the employee from contacting exposed energized conductors or circuit parts.
- If an employee and contractor must handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, the employer shall institute work practices (such as the use of insulation, guarding, and material handling techniques) which will minimize the hazard.
- All portable ladders shall be non conductive if to be use by employees and contractors exposed to energized parts.
- Employees and contractors are not allowed to wear conductive articles of jewelry and clothing such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear if they might contact exposed energized parts. However, such articles may be worn if rendered non conductive by covering, wrapping, or other insulating means.
- Housekeeping duties shall not be performed close enough for possible contact with live parts, unless adequate safeguards such as insulating equipment or barriers are provided.
- Electrically conductive cleaning materials including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions shall not be used near energized parts unless procedures are followed which prevent electrical contact.
- Only qualified persons are allowed to defeat an electrical safety interlock following the above specified procedures for working on or near exposed energized parts, and then only temporarily while they are working on the equipment. Also, the interlock system will be returned to its operable condition when this work is completed and verified to be operational.
- Use of Equipment

    - Portable electrical equipment applies to the use of cord-and-plug connected equipment and flexible cord sets (extension cords).
    - Portable equipment shall be handled in a manner which will not cause damage. Flexible electric cords connected to equipment may not be used for raising or lowering the equipment.

- Flexible cords are not to be fastened with staples or otherwise hung in such a fashion as to damage the outer jacket or insulation.
- Portable cord-and-plug connected equipment and flexible cord sets (extension cords) shall be visually inspected before use on any shift for external defects such as loose parts, deformed and missing pins, or damage to outer jacket or insulation and for possible internal damage such as pinched or crushed outer jacket.
- When defects or evidence of damage which might expose employees to injury are detected, the defective or damaged item shall be removed from service and no person shall use it until it is repaired and tested to ensure it is safe for use.

➢ Grounding-Type Equipment

- Flexible cords used with grounding-type equipment shall contain an equipment grounding conductor.
- Attachment plugs and receptacles may not be connected or altered in any manner which would prevent proper continuity of the equipment grounding conductor at the point where plugs are attached to receptacles. Additionally, these devices may not be altered to allow the grounding pole to be inserted into current connector slots. Clipping the grounding prong from an electrical plug is prohibited.
- Adapters which interrupt the continuity of the equipment grounding connection may not be used.

➢ All portable electric equipment and flexible cords used in highly conductive work locations, such as those with water or other conductive liquids, or in places where employees are likely to contact water or conductive liquids must be approved for those locations.
➢ Employees and contractors hands shall not be wet when plugging and unplugging flexible cords and cord-and-plug connected equipment, if energized equipment is involved. If the connection could provide a conducting path to employees hands, (if, for example, a cord connector is wet from being immersed in water) the energized plug and receptacle connections must be handled only with insulating protective equipment. Locking-type connectors shall be properly locked into connector.

➢ Electric Power and Lightings Circuits

- Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections may not be used for opening, reversing, or closing circuits under load conditions except in an emergency.
- After a circuit is de-energized by a circuit protective device, the circuit may not be manually re-energized until it has been determined that the equipment and circuit can be safely energized. The repetitive manual re-closing of circuit breakers or re-energizing circuits through replaced fuses is prohibited. When it can be determined from the design of the circuit and over current devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before the circuit is re-energized.
- Over-current protection of circuits and conductors may not be modified, even on a temporary basis.

- Test Equipment and Instruments

  - Only qualified persons may perform testing work on electric circuits or equipment.
  - Test instruments and equipment including all associated test leads, cables, power cords, probes and connectors shall be visually inspected for external defects and damage before the equipment is used. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, tagged out of service and no employee may use it until repairs and tests necessary to render the equipment safe have been made.
  - Test instruments, equipment, and their accessories shall be rated for the circuits and equipment to which they will be connected and designed for the environment in which they will be used.

- Where flammable or ignitable materials are present only occasionally, electric equipment capable of igniting them shall not be used unless measures are taken to prevent hazardous conditions from developing. Materials include, but are not limited to; flammable gases, vapors, or liquids; combustible dust; and ignitable fibers or filings.
- Safeguards for Personnel Protection

  - Employees working in areas where there are potential electrical hazards shall be provided with and shall use electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.
  - Protective equipment shall be maintained in a safe, reliable condition, and periodically inspected or tested.
  - If the insulating capability of protective equipment may be subject to damage during use, the insulating material shall be protected by covering with leather or other appropriate materials.
  - Nonconductive head protection shall be worn whenever there is danger of head injury from electric shock or burn due to contact with exposed energized parts.
  - Protective equipment for the eyes or face shall be worn whenever there is danger of injury to the eyes or face from electric arcs, flashes or flying objects resulting from electrical explosion.

- General Protective Equipment and Tools

  - Insulated tools or handling equipment shall be used by employees working near exposed energized conductors or circuit parts if the tools or handling equipment might make contact with such conductors or parts.
  - If the insulating capability of insulated tools or handling equipment is subject to damage, the insulating material shall be protected.
  - Protective shields, protective barriers, or insulating materials must be used to protect each employee from shock, burns, or other electrically related injuries while employees are working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur.
  - When normally enclosed live parts are exposed for maintenance or repair, they are to be guarded to protect unqualified persons from contact with the live parts.
  - Fuse Handling Equipment - insulated for the circuit voltage, shall be used to remove or install fuses when the fuse terminals are energized.

- Ropes and Hand-lines - used near exposed energized parts shall be nonconductive.

➢ The following alerting techniques are used to warn and protect employees from electrical shock hazards, burns, or failure of electric equipment parts.

- Safety signs, safety symbols, or accident prevention tags are to be used where necessary to warn employees about electrical hazards which may endanger them.
- Barricades - are used in conjunction with safety signs where necessary to prevent or limit employee access to work areas exposing employees to un-insulated energized conductors or circuit parts. Conductive barricades may not be used where they might cause an electrical contact hazard.
- If signs and barricades do not provide sufficient warning from electrical hazards, an attendant is to be stationed to warn and protect employees.

3.3.9 Altering Building Wiring and Utilities

Any modifications to existing electrical service in a building must be completed and approved by Business Operation Department. All modifications must meet both safety standards and facilities engineering design requirements.

3.4 Lock Out / Tag Out System

Lockout is the preferred method of isolating machines or equipment from energy sources. All electrical equipment shall be locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy isolating device when it is locked or tagged out.

A tagout system is to be used only if an isolating device cannot be locked out; or, it is demonstrated that a tagout system does provide full workers protection.

The electrical lockout/ tagout procedure is to be implemented in coordination with appropriate procedures for safely isolating other energy systems such as hydraulic, pneumatic, thermal, process gases and fluids, chemical, and mechanical, in order to provide for the isolation of all energy sources that could endanger workers.

The lockout/tagout procedure shall be documented by the Business Operations Department (BOD) - Electromechanical Section and shall contain requirements to safeguard workers while they are working on or near de-energized circuits, parts or equipment in any situation where there is danger of injury due to unexpected energization of the circuit's parts or unexpected start-up of the equipment. Procedures shall require preplanning to determine where and how electric energy sources can be disconnected to safely de-energize circuits and equipment that are to be worked on.

Equipment shutdown procedures shall be included so that the electric equipment involved is safely shut down before circuits are de-energized. Lock out/ tag out permit shall be secured for works that need de-energization or energization of equipment.

3.4.1 Responsibility and Requirements

➢ The QU Electrical Engineer is responsible for the implementation of the lockout/tagout procedures. Employees and contractors shall be trained to understand the safety significance of their responsibilities in implementing

the procedures. The lockout/tagout procedures shall be complied with when work is performed on or near de-energized circuit parts or equipment in any situation where there is a danger of injury due to unexpected energization of the circuit parts or unexpected start-up of the equipment.

- Training is to be provided to ensure that the purpose and function of the program are understood by employees and contractors (knowledge, skills, application, use, removal). Training shall include:

  - Recognition of hazardous energy sources, type and magnitude of energy available, the methods and means for isolation and control.
  - Purpose and use of the procedure.
  - Other employees whose work is in or may be in an area where lockouts/tagouts are used. Instruct about procedure, and prohibition concerning starting locked and/or tagged equipment.

3.4.2 Training

When tagout systems are used, training should include the following limitations of tags:

- Tags are essentially warning devices and do not provide physical restraint.
- Tags must not be removed without authorization of the authorized person using it, and never be bypassed, ignored, or otherwise defeated.
- Tags must be legible and understandable to be effective.
- Tags and their means of attachment must withstand environment.
- Tags may evoke a false sense of security and must be understood as part of an overall program.
- Tags must be securely attached.

3.4.3 Employee Retraining

- Retraining shall be provided annually or when there is a change in job assignments, or change in machines, equipment, or process that present a new hazard, or a change in energy control procedures.
- Retrain when inspections reveal a need, or whenever the employer sees a need.
- Retraining shall reestablish proficiency and introduce new or revised control methods.

3.4.4 Coordination with Other Procedures

The electrical lockout/ tagout procedure is to be implemented in coordination with appropriate procedures for safely isolating other energy systems such as hydraulic, pneumatic, thermal, process gases and fluids, chemical, and mechanical, in order to provide for the isolation of all energy sources that could endanger employees.

3.4.5 Identifiable

Lockout/ tagout devices must indicate the identity of the employee and tagout devices must warn against hazardous conditions. Messages must include:

- **DO NOT START**
- **DO NOT OPEN**

- **DO NOT CLOSE**
- **DO NOT ENERGIZE**
- **DO NOT OPERATE**

3.4.6 Procedural Requirements

- The lockout/tagout procedure shall be documented by the Electromechanical Section and shall contain requirements to safeguard employees, contractors while they are working on or near de-energized circuits, parts or equipment in any situation where there is danger of injury due to unexpected energization of the circuit parts or unexpected start-up of the equipment. Procedures shall require preplanning to determine where and how electric energy sources can be disconnected to safely de-energize circuits and equipment that are to be worked on**.**
- Equipment shutdown procedures shall be included so that the electric equipment involved is safely shut down before circuits are de-energized.
- Employees shall be instructed in the safety significance of the lockout/tagout procedure (Name/Job Title of employees authorized to lockout/tagout). Each new or transferred affected employee and other employees whose work operations are or may be in the area shall be instructed in the purpose and use of the lockout or tagout procedure (Names/Job Title of affected employees and how to notify).
- Contractor shall secure logout/ tagout permit for works that need de-energization or energization of equipment.

3.4.7 Preparation for Lockout or Tagout

Inspect carefully and locate and identify all isolating devices. Be certain which switch(s), valves(s) or other energy isolating devices control the equipment to be locked or tagged out. More than one energy source (electrical, mechanical, or others) may be involved. All type(s) and location(s) of energy isolating means must be found and managed.

3.4.8 Exceptions

Employees and contractors need not document required procedures for a particular machine or piece of equipment when all of the following elements exist:

- The machine/equipment has no potential for stored energy or re-accumulation of stored energy after shutdown, which would endanger employees and contractors.
- The machine/equipment has a single energy source that can be readily identified and isolated.
- The isolation and locking out of the energy source will completely de-energize the machine/equipment.
- The machine/equipment is isolated from that energy source and is locked out during servicing or maintenance.
- A single lockout device will achieve a locked out condition.
- The lockout device is under the exclusive control of the authorized employee performing the service or maintenance.
- The servicing or maintenance does not create hazards for other employees and contractors.
- In utilizing this exception, authorized personnel have had no previous accidents involving the unexpected activation or re-energization of the machine during service or maintenance.

3.4.9 Implementing Lockout/Tagout

Employees and contractors shall implement an orderly shutdown of machinery to avoid any additional or increased hazards resulting from equipment stoppage. The following is a list of steps to be used during shutdown.

- Preparing for Shutdown
  - Identify the types of energy and sources.
  - Notify affected employees of intent to service equipment.
- Shutting Down the Equipment
  - Turn off equipment .
  - Deactivate energy .
  - Release all stored or residual energy .
  - Attach locking and tagging devices.
  - Verify that equipment is secure and deactivated.
- Preparing to Return Equipment to Service
  - Remove all tools from the equipment .
  - Inspect the controls to verify they are in the "off" position.
  - Remove all locking and tagging devices.
  - Re-energize the equipment.
  - Notify affected employees when machine is back in service.

3.4.9.1 Preparation for Shutdown

- Identification of the Energy Type or Source

  Determine where and how equipment is being energized. Since some equipment is powered by several sources (e.g., electrical, mechanical, pneumatic, chemical, thermal and hydraulic), all energizing sources shall be identified. For complex equipment, refer to the manufacturer's control diagram detailing the locations of all isolating points. These points may include breaker panels, switches and valves. Furthermore, possible residual energy and methods used to dissipate or restrain that energy shall be identified. In addition to identifying energy sources, the employee must determine the magnitude of the energy, the hazards of the energy to be controlled and the methods or means to control the energy. If authorized employees are unable to determine each form of energy, they must consult their supervisors before work is started.

- Notification of employees

  Affected employees must be notified by authorized personnel of the intent to service equipment. Notification shall be given before lock out/ tag out controls are applied and should contain the name and job titles of authorized employees, location of equipment being serviced, and duration/date of service.

3.4.9.2 Shutdown of Machine

- Shut Off Equipment

If the machine or equipment is operating, employees shall shut it down by the normal stopping procedures (depress the stop button, open the switch, close valve, etc.).

- Deactivate the Energy

Disconnect the device from all energy sources and release all residual energies that may present a hazard. Inspect the equipment to ensure all energy sources are disconnected.

- Release of Stored or Residual Energy

Release stored or residual energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems and pressurized systems (air, gas, steam, or water). If energy is incapable of being released, the employee shall reposition, block or utilize some other protective measure to prevent the release of residual energy while service is in progress.

- Attach a Lock and Tag

Attach a lock and tag, of designated color, type and descriptive warning, on each disconnecting means used to de-energize circuits and equipment on which work is to be performed. The lock shall be attached to prevent persons from operating the equipment. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use. Additionally, tags shall be attached to all points where equipment or circuits can be energized. If multiple employees are servicing the same equipment, each shall attach their own lock to a multiple lock plate.

- Verify that equipment is secure and deactivated

Test the deactivation of the equipment to ensure that equipment cannot be energized and potential energy sources secured. This should be done by:

- Checking that no personnel are exposed.
- Verifying the isolation of equipment by operating the push button or other normal operating controls. Secure all switches to prevent movement to the "on" or "start" position.
- Checking pressure gauges to ensure de-pressurization of lines.
- Inspecting electrical circuits to confirm zero voltage.

3.4.9.3 Returning Equipment to Service

After service has been completed and the machine is ready to be tested or returned to service the following steps must be followed.

- Inspect the machine and work area.

Inspect the machine(s) to insure that non-essential materials have been removed and the machine is in operating order. Visual inspections shall be conducted to ensure: a) tools and equipment are removed and secured safe guards are in place; and b) blocks, pins and chain (used during the lockout) are removed. Additionally, employees shall verify all equipment components are fully

assembled and operational. Finally, employees shall inspect the work area to ensure that all employees and contractors have been safely positioned or removed from the area.

- Inspect the controls.

  Verify the controls are in neutral or the "off" position.

- Remove the lock devices.

  Each lock shall be removed by the authorized employee that applied it or under his/her direct supervision. If the authorized employee is absent from the work place then the lock or tag can be removed by a qualified person designated to perform this task provided that the immediate supervisor:

  - Verifies that the employee is not present and therefore unable to remove the lock.
  - Makes all reasonable efforts to inform the authorized employee that the lockout/tagout device has been removed.
  - Ensures that the authorized employee knows the lockout/ tagout device has been removed before work resumes.

- Re-energize the machine.

  After completing the above steps, restore the energy to the machine.

- Notify affected employees.

  Notify affected employees that the servicing or maintenance is completed, and the machine or equipment is ready for use.

3.5 Hot Work Permitting System

The purpose of Hot Work Permitting is to protect personnel and property from a fire caused by hot work. The permitting system defines the responsibilities and requirements for performing hot work and establishes controls through the use of a hot work permit.

This system establishes the means to assess the work area and the planned hot work activity to ensure sufficient and necessary controls are in place to prevent a fire.

Hot work will only be performed in areas that are or have been made fire safe. Where fire prevention precautions, such as a fire suppression system or a fire or smoke detection system, are not sufficient a fire watch person shall be assigned to monitor the area for fire, as needed.

3.5.1 Scope

- This procedure applies to all hot work performed on QU property, including work performed by QU employees and contractors. Hot work includes any temporary operation, scheduled or emergency, indoor or outdoor, involving open flames or producing heat and/or sparks.

- The following activities requires hot work include torch cutting, welding, soldering, brazing, grinding.

- Permanent areas which are designated areas for long term or permanent performance of hot work, such as a maintenance shop or a detached outside location are not considered hot work as defined above.

3.5.2 Hot Work Limitation

A hot work permit is **not** required for:

- Operations performed that do not generate sufficient heat or sparks to be considered a significant source of ignition to surrounding combustibles.
- Operations performed in permanent areas, which are designated areas for long term or permanent performance of hot work, such as a maintenance shop or a detached outside location.
- Permanent areas where welding, torching, or cutting will be performed must have the following conditions to be exempt from this procedure:

  - Area constructed of noncombustible or fire resistive material.
  - Essentially free of combustible and flammable content.
  - Suitably segregated from adjacent areas.
  - Equipped with a suitable exhaust system capable of removing the fumes and spent gases associated with Hot Work.

3.5.3 Responsibilities

3.5.3.1 Business Operations Department (BOD) - Safety Unit is responsible for the following:

- Overseeing the Hot Work Policy to provide for regulatory compliance.
- Assisting in evaluating specific work to determine if potential hot work exists.
- Inspecting and approving the job site for hot work, as needed.
- Prescribing any additional personal protective equipment (PPE) beyond the minimum required PPE.
- Maintaining copies of hot work permits for one year.

3.5.3.2 Authorized Person

- An Authorized Person shall be responsible for ensuring compliance with this hot work permitting system.
- The authorized person shall have sufficient technical knowledge, training and practical experience in the hot work processes and their associated hazards.
- The authorized person is the Operations & Maintenance Engineer or Supervisor responsible for:

  - Ensuring hot work is identified and performed in accordance with the permitting system requirements.
  - Performing a hazard assessment of the scheduled hot work and the work area, as needed, to establish controls and fire watch requirements (see 3.5.4 Precautions & Requirements)
  - Notifying the Safety Officer of scheduled Hot Work

  - Obtaining any alarm system bypass that may be necessary and ensuring such alarm system is reactivated upon completion of hot work.

- Making sure that persons who will perform hot work have read and understand the Hot Work Permitting System.
- Assuring that persons who will perform hot work have demonstrated competency in the use of hot work equipment and are trained in performing hot work.
- Ensuring that high energy sources are isolated as needed in accordance with the lockout/tagout procedure.
- Approving hot work permits.
- Submit a copy of the permit to the Safety Officer.

3.5.3.3 Hot Work Employee

The worker who is performing the hot work is responsible for:

- Completing hot work orientation/ training to the requirements of this policy.
- Performing hot work in accordance with the requirements of this policy.
- Familiar with the facility and how to sound an alarm in the event of a fire.
- Filling out the work area preparation section of the hot work permit.
- Making the work area fire safe and verifying on the permit that work can start.
- Insuring the required safety precautions per the hot work permit are followed.

3.5.3.4 Fire Watch

The Fire Watch, which simultaneously can be the worker, is responsible for:

- Being alert to all conditions that may directly involve the safety of the cutter or welder and observing the cutter or welder for sparks, flame, or slag that lands on clothing or protective equipment.
- Being trained to the requirements of this policy.
- Having the appropriate fire extinguishing readily available.
- Being familiar with the facility and how to sound an alarm in the event of a fire.
- Extinguishing a fire and/or sounding the fire alarm.
- Calling emergency services at 4403 3600; 4403 3999 and Safety Unit 4403 3528.
- Completing the Closeout section of the permit.

3.5.4 Precautions and Requirements

- A hot work permit must be completed prior to initiating hot work and posted at the work area. The work process shall include (1) an assessment of the facility condition, (2) preparation of the work area, (3) hot work activity, (4) closeout.
- Hot work must be approved by the **Authorized Person.** For externally contracted work the applicable **Project Manager** is the Authorized Person.
- Hot Work is permitted only in areas that are or have been made fire safe.

- Hot Work equipment shall be in good working condition and fully inspected.
- The Authorized Person shall perform a hazard assessment of the scheduled hot work in the work area where the following conditions exist:

- Fire suppression system is not operable or does not exist.
- Fire/smoke detection system is localized only or does not exist.
- Special potential hazards such as work in a confined area, attic, or crawlspace in which an increased fire risk may exist. This hazard assessment includes the identification on the permit any special precautions and controls and the fire watch requirements, which will be at least 60 minutes after completion and may include periodic checks for 2 or 3 hours.
- The floor around the area where the hot work is to be performed shall be swept clean and clear of debris for a radius of 35 feet.
- Combustibles shall be adequately protected or shielded, using flameproof materials. For torch cutting or welding, combustibles shall be relocated at least 35 ft horizontally from the work area. The edges of covers at the floor shall be tight to prevent sparks from going under the covers.
- Openings or cracks in walls, floors, or ducts within 35 feet of the Site shall be tightly covered to prevent the passage of sparks to adjacent areas.
- When torch cutting or welding is performed near combustible partitions or ceilings, fire resistant guards shall be provided to prevent ignition.
- Welding shall not be attempted on a metal partition, wall, ceiling, or roof having a combustible covering. Oil based paints and epoxies shall be no closer than three feet in any direction.
- Fully charged and operable fire extinguishers shall be available in the hot work area. The use of wall mounted fire extinguishers, provided in the facility, is prohibited. Available portable fire extinguishers shall include as a minimum, one 4A:40B:C rated extinguisher within 40 feet of the activity.
- Special precautions shall be taken to avoid accidental operation of automatic fire detection or suppression systems. If the possibility exists that automatic fire detection or suppression systems will be activated as a result of the work activities, then the automatic fire detection or suppression systems shall be isolated from the detectors located in the immediate area.
- Nearby personnel shall be relocated or suitably protected from heat, sparks, slag and arc.

3.6 Safe Lifting and Back Safety

Workers shall follow the proper safe lifting methods to prevent back injury during lifting of materials.

- Avoid lifting and bending whenever you can.
- Avoid the following:
  - Heavy lifting especially repetitive lifting over a long period of time.
  - Twisting at the waist while lifting or holding a heavy load, this frequently happens when using a shovel.
  - Reaching and lifting over your head, across over your head, across a table, or out the back of a truck.
  - Lifting or carrying objects with awkward or odd shapes.
  - Sitting or standing too long in one position, sitting can be very hard on the lower back.
- Place objects up off the floor.
- Raise / lower shelves.
- Use carts.

- Test the weight of an object before lifting by picking up a corner.
- Wear Back Support if necessary.

- Get help if it is too heavy for you to lift it alone.
- Use the following steps when lifting:

  - Take a balanced stance, feet shoulder-width apart.
  - Squat down to lift, get as close as you can.
  - Get a secure grip; hug the load.
  - Lift gradually using your legs, keep load close to you, keep back and neck straight.
  - Once standing, change directions by pointing your feet and turn your whole body. Avoid twisting at your waist.
  - To put load down. Use item 9.0 in reverse.

- Use cranes, hoist, forklift, lift tables and other lift-assist devices for lifting heavy objects (e.g. pump, motor, pipes).
- Exercise regularly.

3.7 Use of Scaffolding

The proper use of scaffolding shall be complied by contractors and workers to prevent incident and accident associated with scaffold work activities.

3.7.1 General Requirements

- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks, shall not be used to support scaffolds or planks.
- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons or as requested for corrective actions by the Safety Officer.
- Guardrails and toe boards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor, except needle beam scaffolds and floats. Scaffolds 4 feet to 10 feet in height having a minimum horizontal dimension in either direction of less than 45 inches, shall have standard guardrails installed on all open sides and ends of the platform.
- Guardrails must be 2 X 4 inches, or the equivalent, approximately 42 inches high, with a mid-rail, when required. Supports must be at intervals not to exceed 8 feet. Toe board and the guardrail, extending along the entire opening, consisting of No. 18 gauge U.S. standard wire 1/2 inch mesh, or the equivalent.
- Scaffolds and their components must be capable of supporting without failure at least 4 times the maximum intended load.
- Any scaffold including accessories such as braces, brackets, trusses, screw legs, ladders, etc., damaged or weakened from any cause must be immediately repaired or replaced.
- All load-carrying timber members of scaffold framing shall be a minimum of 1,500 fiber (Stress Grade) construction grade lumber.
- All planking must be Scaffold Grades, or equivalent, as recognized by approved grading rules for the species of wood used. The maximum permissible span for 1-1/4 X 9 inch or wider plank of full thickness shall be 4 feet with medium duty loading of 50 psf.
- All planking or platforms must be overlapped (minimum 12 inches), or secured from movement.

- An access ladder or equivalent safe access must be provided.
- Scaffold planks must extend over their end supports not less than 6 inches nor more than 18 inches.

- The poles, legs, or uprights of scaffolds must be plumb, and securely and rigidly braced to prevent swaying and displacement.
- Overhead protection must be provided for men on a scaffold exposed to overhead hazards.
- Slippery conditions on scaffolds shall be eliminated immediately after they occur.
- No welding, burning, riveting or open flame work shall be performed on any staging suspended by means of fiber or synthetic rope. Only treated or protected fiber or synthetic ropes shall be used for or near any work involving the use of corrosive substances or chemicals.
- Wire synthetic, or fiber rope used for scaffold suspension shall be capable of supporting at least 6 times the rated load.

3.7.2 Wood Scaffolding

- All lumber used in constructing ramps, platforms, staging, scaffolding, etc., must be of good quality, seasoned and straight grained, free of large loose or dead knots and knots in groups, checks, splits and other defects which tend to decrease the structural strength.
- No nail should be subjected to direct pull. A minimum of four nails per joint is recommended. The size of the nail used will depend upon the load that must be carried by the joint and the thickness of the material being joined, one inch stock requiring 8d nails, two inch stock requiring 16d nails, etc.

3.7.3 Tabular Steel Scaffolding

- Steel scaffolding should be erected and used in accordance with manufacturer's recommendations. Proper seating and locking of all connections is of extreme importance
- light duty tube and coupler scaffold shall have all posts, bearers, runners, and bracing of nominal 2 inch O.D. steel tubing. The posts shall be spaced no more than 6 feet apart by 10 feet along the length of the scaffold. Other structural metals when used must be designed to carry an equivalent load. No dissimilar metals shall be used together on any tube coupler scaffold.
- A medium duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal 2 inch O.D. steel tubing. Posts spaced not more than 6 feet apart by 8 feet along the length of the scaffold must be bearers of nominal 2 1/2 O.D. steel tubing.
- A heavy duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal 2 inch O.D. Steel tubing, with the posts spaced not more than 6 feet by 6 feet 6 inches.
- Posts must be accurately spaced, erected on suitable bases, and maintained plumb.
- Runners shall be erected along the length of the scaffold, located on both the inside and the outside posts at even heights. Runners shall be interlocked to the inside and the outside posts at even heights. Runners shall be interlocked to form continuous lengths and coupled to each post. The bottom runners must be located as close to the base as possible. Runners must be placed not more than 6 feet-6 inches on centers.
- Bearers must be at least 4 inches but not more than 12 inches longer than the post spacing or running spacing.

3.7.4 Manually Propelled Mobile Scaffolds

- Cross bracing must be installed across the width of the scaffold at least every third set of posts horizontally and every fourth runner vertically. Such bracing must extend diagonally from the inner and outer runners upward to the next outer and inner runners.
- Longitudinal diagonal bracing on the inner and outer rows of poles shall be installed at approximately a 45 degree angle from near the base of the first outer post upward to the extreme top of the scaffold. Where the longitudinal length of the scaffold permits, such bracing shall be duplicated beginning at every fifth post. In a similar manner, longitudinal diagonal bracing shall also be installed from the last post extending back and upward toward the first post. Where conditions preclude the attachment of the bracing to the posts, it may be attached to the runners.
- The entire scaffold shall be tied to and securely braced against the building at intervals not to exceed 30 feet horizontally and 26 feet vertically.
- Guardrails made of lumber not less than 2 x 4 inches (or other material providing equivalent protection), approximately 42 inches high, with a mid-rail of 1 x 6 inch lumber (or other material providing equivalent protection), and toe boards shall be installed at all open sides and ends on all scaffolds more than 10 feet above the ground or floor. Toe boards shall be a minimum of 4 inches in height. Wire mesh shall be installed when needed.

3.8 Use of Stairways and Ladders

Employees and contractors shall follow this guideline on safe use of stairways and ladders. This can also provide as reference for the design and construction of fixed general industrial stairways (interior and exterior), portable extension ladders, stepladders, permanent fixed ladders and ladders used for construction**.**

3.8.1 Requirements of Stairway or Ladder

- A stairway or ladder must be provided at all worker points of access where there is a break in elevation of 19 inches (48 cm) or more and no ramp, runway, embankment or personnel hoist is provided.
- Where there is only one point of access between levels, it must be kept clear to permit free passage by workers. If free passage becomes restricted, a second point of access must be provided and used.
- All construction stairway and ladder fall protection systems required by these rules must be installed and all duties required by the stairway and ladder rules must be performed before employees begin to work that requires them to use stairways or ladders and their respective fall protective systems.
- Fixed stairs shall be provided for access from one structure to another where operations necessitate regular travel between levels and for access to operating platforms at any equipment which requires attention routinely during operations. Fixed stairs shall also be provided where access to elevations is daily or at each shift for such purposes as gauging, inspection, regular maintenance, etc., where such work may expose employees to acids, caustics, gases, or other harmful substances, or for which purposes the carrying of tools or equipment by hand is normally required. (This does not preclude the use of fixed ladders for access to fixed tanks, towers, and similar structures, overhead traveling cranes, etc. where the use of fixed ladders is a common practice.) Spiral stairways shall not be permitted except for special limited usage and secondary access situations where it is not

practical to provide a conventional stairway. Winding stairways may be installed on tanks and similar round structures where the diameter of the structure is not less than five (5) feet.

3.8.2 Stair-rails and Handrails.

The following apply to all stair-rails and handrails

- Stairways having four or more rises, or rising more than 30 inches (76 cm) in height, whichever is less, must have at least one handrail provided on closed stairways preferably on the right side descending. A stair-rail must also be installed along each unprotected side or edge. When the top edge of a stair-rail system also serves as a handrail, the height of the top edge must not be more than 37 inches (94 cm) nor less than 36 inches (91.5 cm) from the upper surface of the stair-rail to the surface of the tread.
- Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.
- Employees should always use handrails whenever ascending or descending stairs**.**

3.8.3 Safety Precautions on the Use of Ladder.

The following safety precautions shall be observed in the use of all ladders:

- When portable ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet (.9 m) above the upper landing surface. The ladder must be secured and a grasping device, such as a grab rail, must be provided to assist workers in mounting and dismounting the ladder. A ladder extension must not deflect under a load that would cause the ladder to slip off its support.
- Ladders must be maintained free of oil, grease and other slipping hazards.
- Ladders must not be loaded beyond the maximum intended load for which they were built beyond their manufacturers' rated capacity.
- Ladders must be used only for the purpose for which they were designed.
- Non self-supporting ladders must be used at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder. Wood job-made ladders with spliced side rails must be used at an angle where the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders must be used at a pitch no greater than 90 degrees from the horizontal, measured from the back side of the ladder.
- Ladders must be used only on stable and level surfaces unless secured to prevent accidental movement.
- Ladders must not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Slip-resistant feet must not be used as a substitute for care in placing, lashing, or holding a ladder upon slippery surfaces.
- Ladders placed in areas such as passageways, doorways, driveways or where they can be displaced by workplace activities or traffic, must be secured to prevent accidental movement, or a barricade must be used to keep traffic or activities away from the ladder.
- The area around the top and bottom of the ladders must be kept clear.
- The top of a non self-supporting ladder must be placed with two rails supported equally unless it is equipped with a single support attachment.
- Ladders must not be moved, shifted or extended while in use.

- Ladders must have non conductive side-rails if they are used where the worker or the ladder could contact exposed energized electrical equipment.

- Users are cautioned to take proper safety measures when metal ladders are used in areas containing electrical circuits to prevent short circuits or electrical shock.
- The top or top step of a step-ladder must not be used as a step.
- Cross-bracing on the rear section of step-ladder must not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders must be inspected by a competent person for visible defects on a periodic basis and after any incident that could affect their safe use**.**
- Single-rail ladders must not be used.
- When ascending or descending a ladder, employees must face the ladder.
- Employee, contractors must use at least one hand to grasp the ladder when moving up or down the ladder.
- An employee on a ladder must not carry any object or load that could cause the worker to lose balance and fall.

3.8.4 Structural Defects in Ladders.

- Portable ladders with structural defects, such as broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, must immediately be marked defective, or tagged with "DO NOT USE" or similar language and must be withdrawn from service until repaired.
- Fixed ladders with structural defects, such as broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, must be withdrawn from service until repaired.
- Defective fixed ladders are considered withdrawn from use when they are immediately tagged with "DO NOT USE" or similar language; marked in a manner that identifies them as defective; or blocked (such as with a plywood attachment that spans several rungs).
- Ladder repairs must restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.

3.8.5 Care and Maintenance of Ladders

- To get maximum serviceability, safety and to eliminate unnecessary damage of equipment, good safe practices in the use and care of ladder equipment must be employed by the users. The following rules and regulations are essential to the life of the equipment and the safety of the user.
- Ladders must be maintained in good usable condition at all times; the joint between the steps and side rails shall be tight, all hardware and fittings securely attached and the moveable parts shall operate freely without binding or undue play.
- Metal bearings of locks, wheel pulleys, etc., shall be frequently lubricated.
- Frayed or badly worn rope shall be replaced.
- Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.
- Ladders shall be inspected frequently and those with defects shall be withdrawn from service for repair or destruction and tagged or marked as "DANGEROUS - DO NOT USE".

- If ladders tip over, inspect ladder side rails for dents or bends, or excessive dented rungs; check all rung to side rail connections; check hardware connections; check rivets for shear.

- If ladders are exposed to oil and grease, equipment should be cleaned of oil, grease, or slippery materials. This can easily be done with a solvent or steam cleaning.

3.8.6 Cages for Fixed Ladders

- Horizontal bands must be fastened to the side rail ladders or directly to the structure, building or equipment for individual rung ladders.
- Vertical bars must be on the inside of the horizontal bands and must be fastened to them.
- Cages must not extend less than 27 inches (68 cm) or more than 30 inches (76 cm) from the center line of the step or rung and must not be less than 27 inches (68 cm) wide
- The inside of the cage must be clear of projections.
- Horizontal bands must be spaced at intervals not more than 4 feet (1.2m) apart measured from center line to center line.
- Vertical bars must be spaced at intervals not more than 9 1/2 inches (24 cm) apart measured from center line to center line.
- The bottom of the cage must be between 7 feet (2.1 m) and 8 feet (2.4m) above the point of access to the bottom of the ladder. The bottom of the cage must be flared not less than 4 inches (10 cm) between the bottom horizontal band and next higher band.
- The top of the cage must be a minimum of 42 inches (1.1 m) above the top of the platform or the point of access at the top of the ladder. Provisions must be made for access to the platform or the point of access.

3.8.7 Wells for Fixed Ladders

- Wells must completely encircle the ladder.
- Wells must be free of projections.
- The inside face of the well on the climbing side of the ladder must extend between 27 inches (68 cm) and 30 inches (76 cm) from the center line of the step or rung.
- The inside width of the well must be at least 30 inches (76 cm).
- The bottom of the well above the point of access to the bottom of the ladder, must be between 7 feet (2.1 m) and 8 feet (2.4 m).

3.8.8 Ladder Safety Devices and Related Support Systems for Fixed Ladders

- All safety devices must be capable of withstanding, without failure, a drop test consisting of a 500 pound weight (226 kg) dropping 18 inches (41 cm).
- All safety devices must permit the worker to ascend or descend without continually having to hold, push or pull any part of the device, leaving both hands free for climbing.
- All safety devices must be activated within 2 feet (.61 m) after a fall occurs and limit the descending velocity of an employee to 7 feet/sec (2.1 m/sec or less).
- The connection between the carrier or lifeline and the point of attachment to the body belt or harness must not exceed 9 inches (23 cm) in length.

3.8.9 Training Requirements.

A training program must be provided for each employee using ladders and stairways. The program must enable each employee to recognize hazards related to ladders and stairways and to use proper procedures to minimize these hazards. For construction operations, additional employee training is required.

Employees and contractors must be trained by a competent person in the following areas, as applicable:

- The nature of fall hazards in the work area.
- The correct procedure for erecting, maintaining and disassembling the fall protection systems to be used.
- The proper construction, use, placement and care in handling of all stairways and ladders.
- The maximum intended load-carry capacities of ladders used.

3.9 Walking - Working Surfaces, Floor Openings

3.9.1 Walking-Working Surfaces

- All shop areas, utility rooms, halls, and storerooms shall be kept clean and orderly.
- All floors shall be kept clean and dry as possible.
- Aisles used by material handling equipment shall be appropriately marked on the floor.
- Aisles, passageways and floors shall be kept free of any obstructions such as protruding rails, splinters, holes or loose boards.
- Covers or guardrails shall be provided to protect employees from open holes, ditches, etc.

3.9.2 Guarding Floor Openings, Wall Openings And Holes

- Floor opening is any opening measuring at least 12 inches (30.48 cm) or more in any floor, roof, or platform through which a person may fall.
- Every stairway floor opening shall be guarded by a standard railing. All exposed sides (except entrance) shall be guarded.
- All ladder-way floor openings shall be guarded by a railing with toe boards and a swinging gate.
- Every hatchway and chute floor opening shall be guarded by either a hinged floor opening with standard railing or a removable railing with toe board on two sides and fixed railings opening with standard railing or a removable railing with toe board on two sides and fixed railings with toe boards on all other exposed sides.
- All pit and trap door openings infrequently used when the cover is not in place shall either be constantly attended by an employee or protected on all exposed sides by removable railings.
- Every temporary floor opening including manholes, when the cover is not in place shall be constantly attended by an employee until the work requiring the opening has ended or protected by removable railings if posting of an employee is ineffective or not feasible.

3.9.3 Wall Openings

- All wall openings where there is a drop of more than 4 feet (1.22 meters) shall be protected by a rail, roller, picket fence, half door or equivalent barrier.
- Every temporary wall opening shall have adequate guards.

3.9.4 Open Sided Floors, Platforms and Runways

- Every open sided floor or platform 4 feet (1.22 meters) or more above the adjacent floor or ground level shall be guarded by standard railings.
- Toe boards shall be provided when employees can pass beneath the open sides or falling materials could cause a hazard.

3.10 Use of Hand and Power Tools

Employees, contractors working at the University where the use of hand or power tools are employed shall use the following safety guidelines.

- Select the right tool for the job. Examples of unsafe practices are: striking hardened faces of hand tools together (such as using a carpenter's hammer to strike another hammer, hatchet, or metal chisel), using a file for a pry, a wrench for a hammer, and pliers instead of the proper wrench.
- Keep tools in good condition. Wrenches with cracked work jaws, screw drivers with broken points or broken handles, hammers with loose heads, dull saws, and extension cords or electric tools with broken plugs, improper or removed grounding lugs, or split insulation are examples of tools in poor conditions. Tools that have deteriorated in this manner must be taken out of service.
- Use tools in the right way. Screw drivers applied to objects held in the hand, knives pulled toward the body, and failure to ground electrical equipment are common causes of accidents.
- Keep tools in a safe place. Many accidents have been caused by tools falling from overhead and by knives, chisels, and other sharp tools carried in pockets or left in tool boxes with cutting edges exposed.
- Steps to be used to control tool accidents.

  - Supervisors are to ensure that employees are trained to select the right tools for each job.
  - Tools shall be inspected prior to use.
  - Proper storage shall be provided for all tools, in the tool room and/or on the job.

- The employee, contractor is to never carry tools, which in any way may interfere with his/her using both hands freely on a ladder or while climbing on a structure. A strong bag, bucket, or similar container is to be used to hoist tools from the ground to the job. Tools are to be returned in the same manner, not brought down by hand, carried in pockets or dropped to the ground.

  Mislaid and loose tools cause a substantial portion of hand tool injuries. Tools should not be left where employees, contractors are moving or walking.

  Chisels, screwdrivers, and pointed tools shall never be carried in a worker's pocket. They are to be carried in a tool box or cart, in a carrying belt (sharp or pointed end down) like those used by electricians and steel workers, in a pocket tool pouch, or in the hand with points and cutting edges pointing away from the body.

Employees, contractors carrying tools on their shoulders should pay close attention to clearances when turning around and should handle the tools so that they will not strike other employees.

- Appropriate personal protective equipment, e.g. safety goggles, gloves, etc. should be worn due to hazards that may be encountered while using portable power tools and hand tools.

  Employees, contractors using hand and power tools and exposed to the hazard of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, vapors, or gases are to be provided with the particular personal protective equipment necessary to protect them from the hazard.

3.10.1 Metal Cutting Hand Tools

- Chisels

  Factors determining the selection of cold chisels are the materials to be cut, the size and shape of the tool, and the depth of the cut to be made.

  The chisel should be made heavy enough so that they will not buckle or spring when struck.

  A chisel no larger than the job should be selected so that the blade is used rather than the point or corner. Also, a hammer heavy enough to do the job should be used.

  Employees, contractors shall wear safety goggles when using a chisel and should set up a shield or screen to prevent injury to other workers from flying chips. If a shield does not afford positive protection to all exposed employees, then glasses with side protection should be worn.

- Tap and Die Work

  Tap and die work requires certain precautions. The work should be firmly mounted in the vise. Only a T-handle wrench or adjustable tap wrench should be used. When threads are being cut with a hand die, hands and arms should be kept clear of the sharp threads coming through the die, and metal cuttings should be cleared away with a brush

- Hack Saws

  Hacksaws should be adjusted in the frame to prevent buckling and breaking, but should not be tight enough to break off the pins that support the blade. Install blade with teeth pointing forward.

  Pressure should be applied on the forward stroke not on the back stroke. If the blade is twisted or too much pressure is applied, the blade may break and cause injury to the hands or arms of the user.

- Files

  Selection of the right kind of file for the job will prevent injuries and lengthen the life of the file. Inasmuch as the extremely hard and brittle steel of the file chips easily, the file should never be cleaned

by being struck against a vise or other metal object. A file-cleaning card or brush should be used.

For the same reason, a file is not to be hammered or used as a pry. Such abuse frequently results in the file's chipping or breaking causing injury to the user. A file should not be made into a center punch, chisel, or any other type of tool because the hardened steel may fracture in use.

A file is never to be used without a smooth, crack-free handle; if the file should bind, the tang may puncture the palm of the hand, the wrist, or other part of the body. Under some conditions, a clamp-on raised offset handle may be useful to give extra clearance for the hands. Files are not to be used on lathe stock turning at high speed (faster than three turns per file stroke) because the end of the file may strike the chuck, dog, or face plate and throw the file (or metal chip) back at the operator hard enough to inflict serious injury.

- Tin Snips

Tin snips should be heavy enough to cut the material so easily that the worker needs only one hand on the snips and can use the other to hold the material. The material is to be well supported before the last cut is made so that cut edges do not press against the hands.

Jaws of snips are to be kept tight and well lubricated.

Employees and contractors shall wear safety goggles when trimming corners or slivers of metal because small particles often fly with considerable force. They shall always wear gloves.

- Cutters

Cutters used on wire, reinforcing rods, or bolts should have ample capacity for the stock; otherwise, the jaws may be sprung or spread. Also, a chip may fly from the cutting edge and injure the user.

Cutters require frequent lubrication. To keep cutting edges from becoming nicked or chipped, cutters are not to be used as nail pullers or pry bars.

Cutter jaws should have the hardness specified by the manufacturer for the particular kind of material to be cut. By adjustment of the bumper stop behind the jaws, cutting edges are to be set to have a clearance of 0.003 inch when closed.

3.10.2 Wood Cutting Tools

Edged tools are to be used so that if a slip should occur, the direction of force will be away from the body. For efficient and safe work, edged tools are to be kept sharp and ground to the proper angle. A dull tool does a poor job and may stick or bind.

- Chisels

Inexperienced employees and contractors shall be instructed in the proper method of holding and using chisels. Handles are to be free of splinters.

The wood handle of a chisel struck by a mallet is to be protected by a metal or leather cap to prevent it from splitting.

The work to be cut must be free of nails to avoid damage to the blade or cause a chip to fly into the user's face or eye.

- Saws

Saws should be carefully selected for the work they are to do. For crosscut work on green wood, a coarse saw (4 to 5 points per inch) is to be used. A fine saw is better for smooth, accurate cutting in dry wood. Saws are to be kept sharp and well set to prevent binding.

- Axes

An axe person is to make sure that there is a clear circle in which to swing the axe before starting to chop. Also, all vines, brush, and shrubbery within the range should be removed, especially overhead vines that may catch or deflect the axe.

Axe blades shall be protected with a sheath or metal guard wherever possible. When the blade cannot be guarded, it is safer to carry the axe at one's side. The blade on a single-edged axe shall be pointed down.

- Hatchets

Hatchets shall not be used for striking hard metal surfaces since the tempered head may injure the user or others by flying chips. When using a hatchet in a crowded area, employee shall take special care to prevent injury to themselves and other workers. Using a hatchet to drive nails is prohibited.

3.10.3 Miscellaneous Cutting Tools

- Planes, Scrapers, Bits, and Drawknives

Planes, scrapers, bits, and drawknives are to be used only by experienced employees. These tools are to be kept sharp and in good condition.

The principal hazard in the use of knives is that hands may slip from the handle onto the blade or that the knife may strike the body or the free hand. A handle guard or a finger ring (and swivel) on the handle eliminates these hazards. Adequate guarding is important.

Employees and contractors who must carry knives with them on the job shall keep them in sheaths or holders. Never carry a sheathe knife on the front part of a belt. Always carry it over the right or left hip, toward the back. This will prevent severing a leg artery or vein in case of a fall.

Knives must never be left lying on benches or in other places where they may cause hand injuries. Safe placing and storing of knives is important to knife safety.

Supervisors must make certain that employees and contractors who handle knives have ample room in which to work so they are not in danger of being bumped by other workers.

Supervisors should be particularly careful about the hazard of employees and contractors leaving knives hidden under a product, under scrap paper or wiping rags, or among other tools in work boxes or drawers. Knives are to be kept separate from other tools to protect the cutting edge of the knife as well as to protect the employee.

Horseplay shall be prohibited around knife operations. Throwing, "fencing", trying to cut objects into smaller and smaller pieces, and similar practices are not only dangerous but reflect inadequate supervision. .

Supervisors shall assure that nothing is cut that requires excessive pressure on the knife. Knives shall not be used as a substitute for can openers, screwdrivers, or ice picks.

3.10.4 Torsion Tools

Socket wrenches are safer to use than adjustable or open-end wrenches.

- Open-End or Box Wrenches

  Open-end or box wrenches shall be inspected to make sure that they fit properly and are never to be used if jaws are sprung or cracked. When defective they shall be taken out of service until repaired.

- Socket Wrenches

  Socket wrenches give great flexibility in hard-to-reach places. The use of special types shall be encouraged where there is danger of injury.

- Adjustable Wrenches

  Adjustable wrenches are used for many purposes. They are not intended, however, to take the place of standard open-end, box or socket wrenches. They are used mainly for nuts and bolts that do not fit a standard wrench. Pressure is always applied to the fixed jaw.

- Pipe Wrenches

  Pipe wrenches, both straight and chain tong, shall have sharp jaws and be kept clean to prevent slipping.

  The adjusting nut of the wrench is to be inspected frequently. If it is cracked, the wrench shall be taken out of service. A cracked nut may break under strain, causing complete failure of the wrench and possible injury to the user.

  A piece of pipe "cheater" slipped over the handle shall not be used to give added leverage because this can strain a pipe wrench to the breaking point. The handle of every wrench is designed to be long enough for the maximum allowable safe pressure.

  A pipe wrench should never be used on nuts or bolts, the corners of which will break the teeth of the wrench, making it unsafe to use on pipe and fittings. Also, a pipe wrench, when used on nuts and bolts, damages their heads. A pipe wrench shall not be used on valves, struck with a hammer, nor used as a hammer.

- Pliers

  Side-cutting pliers sometimes cause injuries when short ends of wires are cut. A guard over the cutting edge and the use of safety glasses will help prevent eye injuries.

  The handles of electricians' pliers are to be insulated. In addition, employees shall wear the proper electrical rated gloves if they are to work on energized lines.

  Pliers shall not be used as a substitute for a wrench.

- Special Cutters

  Special cutters include those for cutting banding wire and strap. Claw hammers and pry bars shall not be used to snap metal banding material.

- Pipe Tongs

  Employees and contractors must neither stand nor jump on the tongs nor place extensions on the handles to obtain more leverage. They should use larger tongs.

- Screwdrivers

  The practice of using screwdrivers for punches, wedges, pinch bars, or pries shall not be allowed.

  Cross-slot (Phillips-head) screwdrivers are safer than the square bit type, because they have less tendency to slip. The tip must be kept clean and sharp, however, to permit a good grip on the head of the screw.

  The part to be worked upon must never be held in the hands; it should be laid on a bench or flat surface or held in a vise.

  No screwdriver used for electrical work shall have the blade or rivet extending through the handle. Both blade and handle shall be insulated except at the tip.

3.10.5 Shock Tools

- Hammers

  A hammer is to have a securely wedged handle suited to the type of head used. The handle shall be smooth, without cracks or splinters, free of oil, shaped to fit the hand, and of the specified size and length. Employees and contractors shall be warned against using a steel hammer on hardened steel surfaces.

  Instead, a soft-head hammer or one with a plastic, wood, or rawhide head should be used. Safety goggles or safety glasses shall be worn to protect against flying chips, nails, or scale.

- Riveting Hammers

Riveting hammers, often used by sheet metal workers, must have the same kind of use and care as ball pen hammers and should be watched closely for cracked or chipped faces.

- Carpenter's or Claw Hammers

  The faces shall be kept well dressed at all times to reduce the hazard of flying nails while they are being started into a piece of wood. A checker-faced head is sometimes used to reduce this hazard.

  Eye protection is advisable for all nailers and all employees working in the same area.

- Spark-Resistant Tools

  Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum, or wood will provide for safety.

3.10.6 Power Tools

Power tools can be hazardous when improperly used. There are several types of power tools, based on the power source they use: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

Employees and contractors should be trained in the use of all tools - not just power tools. They should understand the potential hazards as well as the safety precautions to prevent those hazards from occurring.

The following general precautions should be observed by power tool users:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.
- All observers should be kept at a safe distance away from the work area.
- Secure work with clamps or a vise, freeing both hands to operate the tool.
- Avoid accidental starting. The worker should not hold a finger on the switch button while carrying a plugged-in tool.
- Tools should be maintained with care. They should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories.
- Be sure to keep good footing and maintain good balance.
- The proper apparel should be worn. Loose clothing, ties, or jewelry can become caught in moving parts.
- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use."

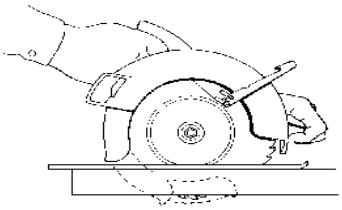
- Guards

  Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or

moving parts of equipment must be guarded if such parts are exposed to contact by employees.

Guards, as necessary, should be provided to protect the operator and others from the following:

- Point of operation
- In-running nip points
- Rotating parts
- Flying chips and sparks



Safety guards must never be removed when a tool is being used. For example, portable circular saws must be equipped with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except when it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work.

- Safety Switches

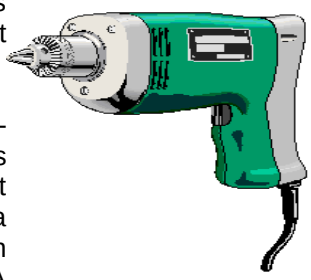
The following hand-held powered tools must be equipped with a momentary contact "on-off" control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than 2 inches in diameter, disc and belt sanders, reciprocating saws, saber saws, and other similar tools. These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

The following hand-held powered tools may be equipped with only a positive "on-off" control switch: platen sanders, disc sanders with discs 2 inches or less in diameter; grinders with wheels 2 inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks <-inch wide or less.

Other hand-held powered tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released.

- Electric Tools

Employees, contractors using electric tools must be aware of several dangers; the most serious is the possibility of electrocution.



Among the primary hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure. Under certain conditions, even a small amount of current can result in fibrillation of the heart and eventual death. A

shock also can cause the user to fall off a ladder or other elevated work surface.

To protect the user from shock, tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool's metal housing. The other end is grounded through a prong on the plug. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong should never be removed from the plug.

Double insulation is more convenient. The user and the tools are protected in two ways: by normal insulation on the wires inside, and by a housing that cannot conduct electricity to the operator in the event of a malfunction.

These general practices should be followed when using electric tools:

- Electric tools should be operated within their design limitations.
- Gloves and safety footwear are recommended during use of electric tools.
- When not in use, tools should be stored in a dry place.
- Electric tools should not be used in damp or wet locations.
- Work areas should be well lighted.
- Electric cords shall be inspected periodically and kept in good condition. Heavy-duty plugs that clamp to the cord should be used to prevent strain on the current-carrying parts, if the cord is accidentally pulled.
- Although no guards are available for drill bits, some protection is afforded if drill bits are carefully chosen for the work to be done, such as being no longer than necessary to do the work.
- Where the operator must guide the drill with the hand, the drill is to be equipped with a sleeve that fits over the drill bit. Oversized bits shall not be ground down to fit small electric drills; instead, an adapter should be used that will fit the large bit and provide extra power through a speed reduction gear; however this again is an indication of improper drill size. When drills are used, the pieces of work are to be clamped or anchored to prevent whipping.
- Electric saws are usually well guarded by the manufacturer, but employees must be trained to use the guard as intended. The guard should be checked frequently to be sure that it operates freely and encloses the teeth completely when it is cutting.
- Circular saws shall not be jammed or crowded into the work. The saw is to be started and stopped outside the work.

➢ Powered Abrasive Wheel Tools

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments.

Before an abrasive wheel is mounted, it should be inspected closely and sound- or ring-tested to be sure that it is free from cracks or defects. To test, wheels should be tapped gently with a light non-metallic instrument. If they sound cracked or dead, they could fly apart in operation and so must not be used. A sound and undamaged wheel will give a clear metallic tone or "ring."

To prevent the wheel from cracking, the user should be sure it fits freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer's recommendations. Care must be taken to assure that the spindle wheel will not exceed the abrasive wheel specifications.

Due to the possibility of a wheel disintegrating (exploding) during start-up, the employee should never stand directly in front of the wheel as it accelerates to full operating speed.

Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.

In addition, when using a powered grinder:

- Always use eye protection.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.

Use of Abrasive Wheels

- Floor stand and bench mounted abrasive wheels, used for external grinding shall be provided with safety guards (protection hoods). The maximum regular exposure of the grinding wheel periphery and sides shall be not more than 90 degrees except that, when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125 degrees.

  Safety guards shall be strong enough to withstand the effect of a bursting wheel.

- Floor and bench-mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable.

  Such work rests shall be kept at a distance not to exceed one-eighth inch from the surface of the wheel.

- Cup type wheels used for external grinding shall be protected by either a revolving cup guard or a band type guard. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods), except as follows:

  When the work location makes it impossible, a wheel equipped with safety flanges shall be used.

  When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used.

- All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks and defects.

- Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.

- All employees using abrasive wheels shall be protected by eye protection equipment.

Dust-type safety goggles or plastic face shields should be worn and, if dust is created, a respirator approved by the National Institute for Occupational Safety & Health (NIOSH) for the exposure should be worn.

If a sander is used steadily, it should be dismantled periodically, as well as thoroughly cleaned every day by being blown out with low-pressure air. If compressed air is used the operator shall wear safety goggles or work with a transparent chip guard between his body and the air blast.

Because wood dust presents a fire and explosion hazard, keep dust to a minimum; sanders can be equipped with a dust collection or vacuum bag. Electrical equipment shall be designed to minimize the explosion hazard. Fire extinguishers approved for Class C (electrical) fires should be available

3.10.7 Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.

There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Eye protection is required and face protection is recommended for employees working with pneumatic tools.

Noise is another hazard. Working with noisy tools such as jackhammers requires proper, effective use of hearing protection.

When using pneumatic tools, employees must check to see that they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.

A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.

Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

Compressed air guns should never be pointed toward anyone. Users should never "dead-end" it against themselves or anyone else.

Use the following safety tips:

- The operating trigger on portable hand-operated utilization equipment shall be so located as to minimize the possibility of its accidental operation and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed.
- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tools from becoming accidentally disconnected.
- Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 p.s.i. pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- Compressed air shall not be used for cleaning purposes except with an air blow gun limited to 30 p.s.i. static pressure at the outlet nozzle and then only with effective chip guard and personal protective equipment.
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fitting shall not be exceeded.
- The use of hoses for hoisting or lowering tools shall not be permitted.
- All hoses exceeding 1/2-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
- Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) shall be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.
- In lieu of the above, a diffuser net which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming in contact with the operator, or other equivalent protection shall be provided.

3.10.8 Fuel Powered Tools

- All fuel powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled, and stored in approved safety cans.
- Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.
- When fuel powered tools are used in enclosed spaces, the applicable requirement for concentrations of toxic gases and use of personal protective equipment shall apply.

3.10.9 Hydraulic Power Tools

- The fluid used in hydraulic powered tools shall be fire-resistant and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.
- The manufacturer's safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.
- All jacks – lever and rachet jacks, screw jacks, and hydraulic jacks - must have a device that stops them from jacking up too high. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack and should not be exceeded.

A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up.

Use wooden blocking under the base if necessary to make the jack level and secure. If the lift surface is metal, place a 1-inch-thick hardwood block or equivalent between it and the metal jack head to reduce the danger of slippage.

To set up a jack, make certain of the following:

- the base rests on a firm level surface,
- the jack is correctly centered,
- the jack head bears against a level surface, and
- the lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be inspected before each use and lubricated regularly. If a jack is subjected to an abnormal load or shock, it should be thoroughly examined to make sure it has not been damaged.

3.10.10 Use and Maintenance of Power-Actuated Tools

- These tools should not be used in an explosive or flammable atmosphere.
- Only employees and contractors who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-activated tool.
- The tool shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- Any tool found not in proper working order or one that has developed a defect during use shall be removed from service immediately and not used until properly repaired.
- Adequate eye, head, face and/or personal protective equipment as necessitated by working conditions shall be utilized by the operators and persons working in the area.
- The tool shall be designed so that it cannot be fired unless it is equipped with a standard protective shield or guard or a special shield, guard, fixture, or jib.
- The firing mechanism shall be designed so that the tool cannot fire during loading or preparation to fire or if the tool is dropped while loaded. Firing of the tools shall be dependent upon at least two separate and distinct operations of the operator, with the final firing movement being separate from the operation of bringing the tool into the firing position
- The tool shall be designed so as not to be operable other than against a work surface and unless the operator is holding the tool against the work surface with force at least 5 pounds greater than the weight of the tool.
- The tool shall be designed so that it will not operate when equipped with the standard guard indexed to the center position if any bearing surface of the guard is tilted more than 8 degrees from contact with the work surface.
- The tool shall be designed so that positive means of varying the power are available or can be made available to the operator as part of the tool or as an auxiliary, to facilitate selection of a power level adequate to perform the desired work without excessive force.

- The tool shall be designed so that all breeching parts will be reasonably visible to allow a check for any foreign matter that may be present.
- Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.
- Loaded tools shall not be left unattended.
- Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- Power-assisted, hammer-driven tools are used for the same purposes as powder-actuated tools and generally the same precautions are to be followed.

3.10.11 Woodworking Tools

- Personal Protective Equipment - All employees using woodworking tools shall be protected by eye protection equipment.
- Guarding - All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for beveled cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.
- Disconnect Switches - All "fixed" power driven wood-working tools shall be provided with a disconnect switch that can either be locked or tagged in the "off" position.
- Self-feed - Automatic feeding devices shall be installed on machines whenever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points
- Speeds - The operating speed shall be etched or otherwise permanently marked on all circular saws over 20 inches in diameter or operating at over 10,000 peripheral feet per minute. Any saw so marked shall not be operated at a speed other than that marked on the blade. When a marked saw is re-tensioned for a different speed, the marking shall be corrected to show the new speed.

3.11 Welding and Cutting Materials

3.11.1 Definition

Gas – Slower and easier to control than electric arc. Uses gas flame over metals until molten puddle is formed. Most popular fuels used with oxygen include acetylene.

Arc – Two metals are joined by generating an electric arc between a covered metal electrode and the base metal.

Oxygen Cutting - Metal is heated by gas flame and an oxygen jet does the cutting

Arc Cutting - Intense heat of electric arc melts away the metal.

3.11.2 General Requirement

- When combustibles cannot be moved from the welding/cutting area, the requirements of NFPA 51B shall be followed. No cutting and welding operation will be permitted without authorization from the BOD-Safety Unit.
- Suitable fire extinguishers shall be available.
- Fire watches are required if welding of cutting and combustibles in the area could be easily ignited by sparks. This could be greater than or less than 35 feet (10.67 meters) from point of operation.
- Cutting or welding shall not be conducted in areas not specifically authorized by the BOD-Safety Unit., in the presence of explosive atmospheres which exist or may develop, and where quantities of combustibles are store.
- Contractor's Maintenance Engineer is responsible for the safe handling and use of the cutting and welding equipment.
- Areas shall be made fire safe before cutting or welding is conducted.
- No welding or cutting shall be done on used drums, barrels, tanks, or containers until they have been cleaned thoroughly.
- All welding cables shall be placed so they are clear of passageways, ladders and stairways.

3.11.3 Oxygen-Fuel, Gas Welding and Cutting

- Transporting, Moving, and Storing Compressed Gas Cylinders

  - Valve protection caps shall be in place.
  - Cylinders shall not be intentionally dropped, struck, or permitted to strike each other violently.
  - Cylinders shall be secured in an upright position by a chain or other suitable means.
  - Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved.
  - When transporting cylinders by cranes, a cradle or suitable platform shall be used.
  - Valve protection caps shall not be used for lifting.
  - Cylinders shall not be moved unless the regulators are removed and valve protection caps are in place, unless they are secured on a special truck.
  - Cylinders shall not be placed so close to work that sparks, hot slag, or flame will reach them.
  - Cylinders shall be placed so that they will not become part of an electrical circuit.
  - Cylinders shall be placed in an upright position, chained or otherwise restrained to prevent falling.

- Use of Fuel Gases

  - Only properly instructed and qualified employees, contractors will operate equipment using fuel gases.
  - Fuel gas shall not be taken into confined spaces.
  - Fuel gas and oxygen manifolds must be clearly identified and placed in well-ventilated area. The manifold hose connections must be such that the hose cannot be interchanged between fuel gas and oxygen manifolds. Header connections will be supplied.

- Oxygen and fuel gas hoses must be easily distinguished from each other by color or surface characteristics. Torches must be inspected at the beginning of each shift for leaking valves, couplings, and connections. Pressure regulators must be in proper working order while in use.
- Cylinders not having fixed hand wheels shall have keys, handles or non-adjustable wrenches on valves stems while in service.
- Valves shall be closed before moving cylinders.
- Valves shall be closed when work is finished.
- Empty cylinder valves shall be closed.
- Before connecting the regulator, the valve shall be opened slightly and closed immediately while the operator stands to one side of the outlet.
- Acetylene cylinder valves shall be opened as little as one-half turn of the spindle - preferably no more than three-fourths of a turn.
- When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use.

- Acetylene shall never be utilized at a pressure in excess of 15 pounds per square inch gage (p.s.i.g.) (1.06 kilograms per square centimeter).

➢ Arc Welding and Cutting

- Oxygen cylinders and fitting shall be kept away from combustible material, especially oil and grease, as oxygen is not compatible with these products.
- Only the correct manual electrode holders shall be used. If the portion gripped by the hand contains current, it must be fully insulated against the maximum voltage encountered to ground.
- Proper welding cables and connectors must be used and must be completely insulated. Splicing, if used, shall be equal to the insulating quality of the cable and shall not be located within 3.05 meters (10 feet) of the electrode holder.
- Ground return cables must have a safe current-carrying capacity equal to or greater than the specified maximum output capacity of the units serviced. When a structure or pipeline is employed as a ground circuit, a determination must be made that the required electric contact exists at all joints.
- The frames of all arc welding and cutting machines shall be grounded with a third wire or a separate wire which is grounded at the source of the current.
- Arc welding or cutting operations shall be shielded by noncombustible or flameproof screens to protect employees and other persons in the vicinity from the direct rays of the arc.
- Employees and contractors performing any type of welding, cutting or heating shall be protected by suitable eye protection equipment.

➢ Resistance Welding

- All equipment shall be installed by a qualified electrician.
- A safety type disconnecting switch, circuit breaker or circuit interrupter shall be provided near the machine.
- Operators shall be properly trained and judged competent to operate the equipment before being designated to do so.
- Controls of all automatic air and hydraulic chargers shall be guarded against accidental activation.

- All doors and panels shall be kept blocked on the resistance welding machines.
- Appropriate shields shall be provided to protect workers and passing employees from the sparks.
- Fire curtains shall be provided.
- For spot and seam welding, voltage shall not exceed 480 volts during operation.

➢ Welding, Cutting, and Heating Relative to Preservation Coatings

- The flammability of protective coatings must be determined before welding, cutting, or heating is commenced on such surfaces.
- When coatings are highly flammable, they shall be stripped from the area to prevent ignition. Protective measures must be taken when the preservative coating is toxic.

3.12 Heat Stress

3.12.1 Background

Heat Stress is influenced by several risk factors: climatic conditions, the work environment, demands of the work, clothing and personal characteristics.

➢ Climatic and environmental conditions that affect the risk of heat-related disorders are air temperature and humidity, air movement, and the temperature of surrounding surfaces which affects radiant heat exchange.
➢ Demands of the work influence the stress on the temperature regulation system. Individual responses to a given work load vary but, as an employee expends more energy, the body's internal metabolic heat production rises. This increases stress on the cardiovascular system to regulate body temperature (i.e., by increasing blood flow to skin). Work-related factors that influence heat stress include work rate, level of physical effort, and duration of activity.
➢ Clothing characteristics such as insulation, permeability, weight, fit and ventilation affect the body's ability to regulate internal temperatures. Other factors that may increase the risk of heat-related disorders include additional equipment, the use of a respirator, or other personal protective equipment (PPE).
➢ Personal characteristics such as age, weight, previous heat stress injury, underlying medical conditions (e.g., diabetes, cardiovascular disorders, chronic pulmonary disease, and thyroid disorders), medication use and overall health and physical fitness contribute to an employee's susceptibility of contracting a heat-related illness.

Working in an environment with heat stress not only increases the risk for specific heat related conditions such as heat exhaustion and heat stroke, but also increases the risk for other adverse events.

3.12.2 Signs and Symptoms of Heat-Related Disorders

Heat related disorders may occur when there is an exposure to heat risk factors. The chart below illustrates some of the signs and symptoms associated with heat stress. If the employee is experiencing any of these symptoms, the employee should be taken to the medical clinic for treatment immediately.

DISORDER	SIGNS	SYMPTOMS
Dehydration	Loss of work capacity Delayed response to stimuli	Fatigue Weakness Dry mouth
Heat Exhaustion	High pulse rate, confusion, anxiety Profuse sweating Low blood pressure Pale face, or flushing Body temperature increased but below 104 degrees F. Excessive thirst, decreased urine output	Fatigue, malaise Weakness Blurred vision Dizziness Headache Nausea Loss of appetite
Heat rash	Skin eruptions	Itching skin, prickly sensation
Heat Stroke	Red face Mental status changes such as disorientation, confusion or irritability Hot, dry skin Erratic behavior Collapse Shivering Body temperature >104 F	May be same as those for heat exhaustion (see above)
Heat Cramps	Incapacitating pain in muscle	Muscle cramps (abdominal and lower extremities) Fatigued muscles
Heat Syncope	Brief fainting or near fainting behavior	Blurred vision

3.12.3 Preventive Controls

A control is a mechanism used to minimize or eliminate an exposure to a hazard, such as heat. There are three types of controls (e.g. engineering, administrative and personal protective equipment) that can be implemented to reduce exposure to excessive heat. Each person and situation is unique, so controls and their application will vary. Suggested controls are given in Suggested Measures to Prevent Heat Stress. Contact BOD-Safety Unit at

telephone number 4403 3528 for help in selecting the most appropriate preventive measures for your work.

- Administrative Controls

  Administrative controls, also known as work strategy controls, are strategies used by supervisors to limit exposure to a hazard. For example, changes to the work schedule (i.e., when and how the job is performed) can limit the amount of time an employee is exposed to elevated temperatures

- Engineering Controls

  Engineering controls are physical changes made to the work environment, such as adding fans or air conditioning to an indoor environment.

- Work Practices and Personal Protective Equipment (PPE)

  Other than hats and loose-fitting clothing, there is a limited selection of personal protective equipment to reduce the risk of heat stress. Contact BOD-Safety Unit for help in evaluating the effectiveness of available personal protective equipment.

  In some cases, personal protective equipment—such as impermeable protective clothing and respirators—may increase the risk of developing a heat-related disorder. If such PPE is truly necessary, administrative and engineering controls may be necessary to allow work in heat risk environments. Contact BOD-Safety Unit for help with these decisions.

3.12.4 Monitoring for Signs and Symptoms of Heat Stress

Supervisors, coworkers and employees themselves are responsible for monitoring for the signs and symptoms of heat-related disorders. See the above table for information on recognizing the signs and symptoms of impending heat stress. A supervisor or coworker is often in the best position to observe the onset of a heat-related disorder.

- When heat stress risks are present, supervisors should regularly check workers (by observation and questions) for signs and symptoms of heat stress.
- Take extra care to monitor those at high risk, such as employees who are older or overweight, employees who overexert themselves, and employees with chronic medical conditions including diabetes, heart or lung disease, thyroid disease or high blood pressure. Employees who take certain medications may also be at increased risk and need to check with their physician.
- If you need to work outdoors or within indoor environments with elevated temperatures, monitor yourself for the signs and symptoms of heat-related illness, such as taking your own pulse.
- Use a buddy system. When working in the heat, monitor the condition of your coworkers and have someone do the same for you.
- Supervisors should check to ensure that employees are self-monitoring, and ask for their determinations.

3.12.5 Issue Heat Alerts

When conditions are present that contribute to heat stress, departments and work units are to alert at risk employees and implement their preventive measures for working in heat. The alert should include a reminder of signs and symptoms, how to control exposure, and a re-emphasis of the preventive work strategies to be followed.

3.13 Confined Space

3.13.1 Definition

Confined Space - A confined space by design has limited or restricted means for entry and exit and is not intended for continuous employee occupancy. Confined spaces include but are not limited to manholes, pipelines, sewers, tunnels, pressure vessels

3.13.2 Permit-Required Confined Space (PRCS)

A Permit-Required Confined Space is required if one or more of the following characteristics are met:

- Contains or has a known potential to contain a hazardous atmosphere. Three of the most common atmospheric conditions that constitute hazards are oxygen deficiency, presence of combustible gases and vapors, and toxic gases and vapors.
- Contains a material with the potential for engulfment of an entrant.
- Contains any other recognized serious safety or health hazard.

Use the Confined Space Entry Permit in Appendix 7.

3.13.3 Authorized Personnel

- Authorized Entrant - An employee who is authorized by the employer to enter a permit required space. Only employees who are trained as an entrant and have obtained a permit signed by the entry supervisor may enter a permit required confined space.
- Attendant - An individual who is stationed outside and monitors authorized entrants. At least one individual must be stationed outside the permit required confined space.
- Entry Supervisor – is a supervisor or foreman responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry, for overseeing entry, and for terminating entry.

3.13.4 Identification of Permit-Required Confined Spaces (PRCS)

Each department is to identify all confined spaces and those suspected of being a PRCS. Subsequent to identification, the department should contact the BOD-Safety Unit to assist in the evaluation of those spaces.

3.13.5 Warning Signs

PRCSs must be posted with warning signs notifying employees of any hazards that are present, and that only authorized entrants may enter the PRCS. An example warning sign may be:

DANGER
PERMIT- REQUIRED CONFINED SPACE
DO NOT ENTER

3.13.6 Evaluation of Permit-Required Confined Space Condition (PRCS)

Each PRCS must be evaluated to identify hazards; determine the severity the hazards; and establish control procedures and practices by which the space may be entered safely. A "Confined Space Hazard Evaluation" form must be completed for each PRCS.

Before entry into a PRCS is authorized, the conditions within the space must be tested to determine if acceptable entry conditions exist. The space must be monitored during the course of entry operations to determine if acceptable entry conditions are being maintained. When testing for atmospheric hazards first test for oxygen deficiency, then for combustible gases and vapors, and then for toxic gases and vapors.

3.13.7 Pre-Entry and Entry Practices and Procedures

Business Operations Department (BOD) -Safety Unit shall review and approved the pre-entry and entry procedures prior to entry. Practices and procedures to be addressed include:

- Isolating (locking and tagging) the PRCS.
- Ventilation of the PRCS.
- Providing vehicle and pedestrian barriers to protect entrants from external hazards.
- Verifying that conditions are acceptable for entry.

3.13.8 Locking and Tagging

No work is to be performed until appropriate locking, tagging and/or isolation is accomplished to prevent the inadvertent actuation of operations or processes associated with the space which might expose employees to hazardous conditions.

3.13.9 Required Equipment

The following equipment is to be provided and maintained to ensure their proper use:

- Testing and monitoring equipment
- Ventilating equipment
- Communications equipment
- Personal protective equipment
- Lighting equipment
- Barriers and shields

- Ladders
- Rescue equipment
- Other equipment necessary for safe entry

3.13.10 Permit System

Before entering a PRCS an authorized employee must complete a "Confined Space Entry Permit" for approval by the entry supervisor. A copy must also be sent to the Health and Safety Office. The permit must include: identity of the space; purpose of entry; date and duration of entry; list of authorized entrants; eligible attendants and individuals to be in charge of entry; hazards of the PRCS; measures for isolation of the space; measures to control potential hazards; the acceptable entry conditions; testing and monitoring equipment and procedures; rescue services in the event of an emergency; rescue equipment to be provided on-site, if necessary; communication procedures between authorized entrants and attendants; and personal protective equipment.

3.13.11 Rescue Team

If an emergency arises that requires a rescue team, the Emergency Medical Service is to be contacted through CSU Control Room 4403 3600. Control Operator shall call 999. The rescue service is to be provided access to all PRCSs from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations. Non-entry retrieval methods are to be used unless the retrieval equipment would increase the overall risk of entry. Each authorized entrant is to use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level. For vertical type PRCSs more than 5 feet deep, a mechanical device for retrieval is to be available.

3.13.12 Training

Employees who are assigned duties that may require entry into PRCS must receive training on confined space entry procedures, the permit system, and hazard recognition and control procedures. Authorized entrants, attendants, and supervisors in charge of entry are to receive training in their respective confined space duties and responsibilities. Training is to be provided: before employees are first assigned duties pertaining to PRCSs; whenever there is a change in assigned duties; whenever there is a change in PRCS operations that present a hazard about which an employee has not been trained; and whenever there are deviations from the entry permit procedures or inadequacies in the employees' use or knowledge of these procedures.

3.13.13 Entry Into Non-Permit Confined Spaces

Precautions must be taken for entry into non-permit required spaces. The space atmosphere must be tested for oxygen concentration, combustible gas or vapor, and potential toxic contaminants. Any hazardous conditions detected must be reported to the supervisor and BOD-Safety Unit. Manholes and confined spaces with limited ventilation must be power ventilated with a blower (minimum capacity 750 cfm) operating at its maximum rated speed for a minimum of 5 minutes. Larger confined spaces (greater than 1000 cubic feet) must be ventilated for at least 10 minutes. The blower must be in continuous operation while anyone is in the confined space.

3.13.14 Confined Space and PRCS Recognition Checklist

3.13.14.1 PART I

- Is the space large enough so an employee can bodily enter and perform work?
- Does the space have limited or restricted means of entry and exit?
- Is the space not designed for continuous occupancy?

If the answer is yes to all items in Part I, continue to Part II. If the answer is no to any of the items in Part I, the space is not considered a confined space.

3.13.14.2 PART II

- Does the space contain or potentially contain a hazardous atmosphere?
- Does the space contain any chemicals or chemical residues?
- Does the space contain any flammable/combustible substances?
- Does the space contain or potentially contain any decomposing organic matter?
- Does the space have any pipes which bring chemicals into it?
- Does the space have any materials that can trap or potentially trap, engulf, or drown an entrant?
- Is vision obscured by dust at 5 feet or less?
- Does the space contain any mechanical equipment servicing the space?
- Does the space have converging walls, sloped floors or tapered floor to smaller cross-sections which could trap or asphyxiate an entrant?
- Does the tank or vessel contains rusted interior surfaces?
- Does the space contains thermal hazards (e.g. cold, hot)?
- Does the space contain excessive noise levels which could interfere with communication with an attendant?
- Does the space presents any slip, trip, or fall hazards?
- Are there any operations conducted near the space opening which could present a hazard to the entrant?
- Are there any hazards from falling objects?
- Are there lines under pressure servicing the space?
- Are cleaning solvents or paints going to be used in the space?
- Is welding, cutting, brazing, riveting, scraping, or sanding going to be performed in the space?
- Is electrical equipment located in or required to be used in the space?
- Does the space have poor natural ventilation which would allow an atmospheric hazard to develop?
- Are there any corrosives which could irritate the eyes in the space?
- Are there any conditions which could prevent any entrant's self rescue from the space?

- Are there any substances used in the space which have acute hazards?
- Is mechanical ventilation needed to maintain a safe environment?
- Is air monitoring necessary to ensure the space is safe for entry due to a potential hazardous atmosphere?
- Will the entry be made into a dike area where the dike is 5 feet or more in height?
- Are residues going to be scraped off the interior surfaces of the vessel?
- Are non-sparking tools required to remove residues?
- Does the space restrict mobility to the extent that it could trap an irritant?
- Is respiratory protection required because of a hazardous atmosphere?

- Does the space present a hazard other than those noted above which would make it a permit space?

If any other questions in PART II have been checked yes, the confined space is a Permit-Required Confined Space (PRCS). As such, entry into these spaces must be performed under the protection of PRCS program.

3.14 Fire Safety

The following are some of the specific fire safety requirements and precautions to be observed in the work area:

- Building shall comply with the International Building Code of 2006 Section 414.
- Building shall comply with the requirements of National Fire Protection Association (NFPA) 45 for construction, ventilation and fire protection, covering the building (s) units and work areas
- Building shall comply with the requirement of National Fire Protection Association (NFPA) 1, Chapter 26 and 60.4.10.3 and 60.4.10.2.3
- Smoking is one of the major causes of fires in the work area. At Qatar University, smoking is prohibited in all work area where the employees and contractor/s performed their specific activities.
- Access key custody of offices, laboratories, stores, etc. should be assigned to the Security in-charged at respective buildings. Users should maintain a duplicate key.
- All fire exits must be clearly marked with exit signs. Fire exit signs should be visible at any location in the office. All fire doors must be kept closed to prevent the spread of fire and smoke during a fire. However, these doors MUST NOT be locked when people are working in the area.
- Floor plans showing fire escape routes and fire assembly points, together with the fire evacuation procedure should be posted at conspicuous locations in the office and classroom
- Hose reels, sprinkler heads and fire extinguishers (if installed) must not be blocked or obstructed. A minimum clearance of 450 mm should be maintained below sprinkler heads.
- Use of Fire Extinguisher. There are four types of fires and using extinguisher improperly or using the wrong extinguisher could result in additional property damage and injury.

    - Class A fires consist of combustibles, such as wood, paper or cloth. This type of fire can be put out with water-filled extinguishers. When using these extinguishers, get as close to the fire as possible without

endangering yourself, and aim the nozzle toward the base of the flames. Continue spraying until all smoldering material is wet down.

A multipurpose dry-chemical extinguisher can also be used on Class A fires. With this type of extinguisher the flames are attacked at the edge of the fire with the nozzle directed at the fire in a sweeping motion. The powdered chemical becomes sticky when heated, allowing it to form a film that clings to the heated material and smother the fire.

- Class B fires includes flammable liquids, such as oil, gasoline, solvents and paint. Dry chemical extinguishers are usually used to fight this type of fire. When using this extinguisher stand approximately 10 feet away from the fire to apply the powder. Then gradually move in closer; applying the powder from side to side near the base of tie fire.

  Carbon dioxide extinguishers are also effective on flammable liquid fires. Use this type of extinguisher near the edge of the fire at close range in an enclosed area where no wind or draft exists. Since fires can spread with the presence of oxygen, carbon dioxide is used to decrease the amount of oxygen surrounding the fire until the air can no longer support the combustion.

- Class C fires are electrical fires. If at all possible, turn off the power in the area before attempting to combat the fire. When electrical equipment is de-energized, extinguishers for Class A or B fire may be safely used; otherwise, the best extinguishers are carbon dioxide and dry chemical extinguishers.

  Carbon dioxide in on conductive and noncorrosive, because dry chemical extinguisher leave sticky film, cleaning is easy.

  Foam or dry-chemical powder can be used to control fires due to liquid or gas leak, such as methane, propane or butane.

- Class D fires involve combustible metal, such magnesium, sodium and potassium.

  The most reactive combustible metals are alkali metals. Water causes these metals to release hydrogen and a large amount of heat, causing the hydrogen to ignite and explode. Even the moisture on your hand may cause the metal to react. Special dry-compound powders, such as powdered graphite and sodium chloride, powdered talc, soda ash and limestone, are made to extinguish these fires. In cases of emergency dry sand can be used.

- Extinguishers should be placed in locations where they are easily seen and aren't apt to be damaged. They should be hung at an appropriate height above the floor within easy reach. These extinguishers come in sizes that allow for easy handling, and there should be an adequate number of them in the area they protect. *Contact* Business Operations Department – Safety Unit, 485 2686, for any information on the proper use of fire extinguisher.

- Business Operations Department – Safety Unit shall ensure that periodic fire safety building inspections (e.g. fire extinguishers, fire hose reel, fire alarm system, fire blanket) is conducted.

- Provision for additional and replacement of fire extinguishers and fire blankets shall be the responsibility of each Department/ College.

- Refilling of fire extinguisher shall be the responsibility of Business Operations Department.

3.15 Emergency Preparedness and Response

The following procedures in case emergency shall be cascaded to all employees, faculties, students and visitors. Refer to Appendix 11 for Emergency Telephone Numbers.

3.15.1 Fire at Main Campus

3.15.1.1 Employee or anyone who witness the fire shall perform the following course of action:

- Push the fire alarm button nearest to the fire location.
- Call the following emergency numbers and ask for help.
  - Central Service Station (CSU) – 4403 3600
  - Fire Section – 4403 3999
- Report the exact location of the fire.
- Inform the nearest security guard about the fire.
- Extinguish the fire if it is on early stage and if you are trained to do so. Leave the building by the nearest safe exit.
- Do not stop to collect personal belongings.
- Do not use the lifts.
- Proceed to the designated assembly point indicated in the emergency evacuation plan posted in your location.

3.15.1.2 Security personnel shall perform the following course of action:

Security supervisor shall:

- Mobilize security personnel to the location of fire.
- Provide instruction to security personnel for securing the area and preventing the entry of unauthorized person.
- Provide instruction to security personnel for securing the recovered documents and equipments.
- Coordinate with QU Fire Section and Electromechanical Unit.

Security Guard near the location of fire shall:

- If the employee, student, or witness is not able to notify CSU and/or Fire Section about the fire, the security guard receiving the information from the witness shall call CSU and/or Fire Section.
- Report the location of fire.
- Extinguish the fire if it is on early stage and if trained to do so.
- Inform security supervisor.

Security Personnel responding to the emergency shall:

- Secure and cordon the area to avoid entry of unauthorized person.
- Secure the evacuation area and assign security member.
- Secure and cordon designated salvage area for recovered documents, and equipments.
- Assist the incoming Fire Brigade Team from Civil Defense.
- Regulate the flow of traffic.
- Provide directions to employees, faculties, students, contractors and visitors to designated evacuation area.

3.15.1.3 Central Service Unit Operator shall perform the following course of action:

- Receive a fire alarm from witness. Get the following information:
  - Name of witness
  - Phone number
  - Location of fire
  - Ask for any injured person
- Call Fire Section for immediate response, 4403 3999.
- Call 999 for assistance, if the fire cannot be control by Fire Section and there are injured person.
- Inform Electromechanical Section.

3.15.1.4 Fire Section personnel shall perform the following course of action:

The Leading Fireman shall:

- Mobilize the fire fighting team upon receiving the information and location of fire.
- Coordinate with Electromechanical Unit of BOD to de-energize/isolate electrical equipment or any electrical source from the fire scene.
- Provide instruction to fire fighting team during rescue and evacuation.
- Coordinate with Fire Brigade Team of Civil Defense if their presence is needed during fire.
- Coordinate with the QU Medical Clinic, if their assistance is needed, for treatment of injured personnel.
- Inform Central Service Unit Control Room to call 999 if the fire cannot be control by QU Fire Section.

Firemen shall:

- Wear fire fighting suits.
- Go to the location of fire.
- Bring additional fire extinguisher.
- Bring Self Contained Breathing Apparatus.
- Extinguish the fire using fire extinguisher if it is still on early stage. Use hydrant and fire hose if the fire extinguisher is not capable of extinguishing the fire.
- Conduct rescue and evacuation.
- If the rescue and evacuation cannot be performed, provide assistance to Fire Brigade Team of Civil Defense in conducting rescue and evacuation.
- Provide assistance to Fire Brigade Team of Civil Defense in extinguishing the fire if necessary.

3.15.1.5 The QU Medical Team shall perform the following course of action (applicable only during office hour):

- Coordinate with QU Leading Fireman if medical assistance is needed.
- Mobilize medical equipments.
- Provide treatment to injured personnel.
- Coordinate with the nearest hospital for possible medical treatment of injured personnel.
- Provide assistance to Emergency Medical Services of Civil Defense if necessary.

3.15.1.6 Electromechanical Section personnel and/or O& M contractor shall perform the following course of action:

- De-energize/isolate electrical equipment or any electrical source from the fire scene.
- Energize electrical equipment or electrical source after the repair completion of the damage equipment or electrical source.

3.15.1.7 The QU Leading Fireman and/ or Fire Brigade Team Leader of Civil Defense shall declare All Clear signal that fire has been stopped.

3.15.1.8 Professors, faculties ensure that students shall follow the emergency procedures and evacuation plan.

3.15.1.9 The QU Leading Fireman shall prepare fire accident report and submit to Safety Unit.

3.15.1.10 Safety Unit shall submit final report on fire accident to Electromechanical Section for review

3.15.1.11 Electromechanical Section shall submit report on fire accident to the Director of Business Operations Department.

3.15.2 Fire at Environmental Studies Center

3.15.2.1 Employee or anyone who witness the fire shall perform the following course of action:

- Push the fire alarm button nearest to the fire location.
- Inform the nearest security guard about the fire.
- Report the exact location of the fire.

- Extinguish the fire if it is on early stage and if you are trained to do so.

3.15.2.2 Security personnel shall perform the following course of action:

Security Guard near the location of fire shall:

- Extinguish the fire if it is on early stage and if trained to do so.
- Call other Security personnel for help.
- Call 999 for help.
- Inform security supervisor.

Security Personnel responding to the emergency shall:

- Extinguish the fire if it is on early stage and if you are trained to do so.
- Secure and cordon the area to avoid entry of unauthorized person.
- Secure the evacuation area and assign security member.
- Secure and cordon designated salvage area for recovered documents, and equipments.
- Assist the incoming Fire Brigade Team from Civil Defence.
- Regulate the flow of traffic.
- Provide directions to employees, students, contractors and visitors to evacuation area (i.e. Parking Area).

Security Supervisor shall perform the following course of action:

- Assist the Fire Brigade Team from Civil Defence.
- Inform the Director of Business Operations Department.
- Inform the QU Fire Section.

3.1.15.2.3 The Fire Brigade Team Leader of Civil Defence shall declare All Clear signal that fire has been stopped.
3.1.15.2.4 The QU Leading Fireman shall prepare fire accident report and submit to Safety Unit.
3.1.15.2.5 Safety Unit shall submit final report on fire accident to Electromechanical Section for review.
3.1.15.2.6 Electromechanical Section shall submit report on fire accident to the Director of Business Operations Department.

3.15.3 Medical Distress / Injury

3.15.3.1 Do not panic.
3.15.3.2 Don't move the person; call immediately the security guard nearest to your area. Ask him/her to call QU Medical Clinic at telephone number 4403 3294.
3.15.3.3 If the person requires medical treatment, Security shall call Control Room Operator, 4403 3600.
3.15.3.4 Control Room Operator shall call 999 for help.
3.15.3.5 Do not conduct first aid if you are not an accredited first aider, it may aggravate the situation. Wait for medical assistance.

3.15.3.6 Upon arrival of medical assistance, provide your name and describe the type of emergency you have.

3.15.3.7 Security shall conduct an investigation. Report shall be submitted to the Office of the Director of Business Operations Department.

3.15.4 Utility Failure

3.15.4.1 Electrical/Light Failure

- Remain calm. University buildings are equipped with emergency lightings. However, it is recommended to consider keeping a flashlight in laboratory in case of electrical/ light failure for safe exiting.
- Call Business Operations Department CSU Control Room at telephone no. 4403 3600.
- Provide the following information to CSU Control Operator
    - Your name
    - Location of building where the water leak.
    - Contact number
- Control Room Operator to coordinate with O & M contractor for rectification. Inform Business Operations Department – Electromechanical Section.

3.15.4.2 Plumbing Failure/ Water Leak

- Cease all electrical equipment.
- Call Business Operations Department CSU Control Room at telephone no. 4403 3600.
- Provide the following information to CSU Control Operator
    - Your name
    - Location of building where the water leak
    - Contact number
- Control Room Operator to coordinate with O & M contractor for rectification. Inform Business Operations Department – Electromechanical Section.

3.15.4.3 Gas Leak

- Do not panic
- Cease all operations.
- Exit the area immediately.
- Do not attempt to correct the problem yourself.
- Call Business Operations Department CSU Control Room at telephone no. 4403 3600.
- Provide the following information to CSU Control Operator
    - Your name
    - Location of building where the gas leak
    - Contact number

- Control Room Operator to coordinate with O & M contractor for rectification. Inform Business Operations Department – Electromechanical Section.

3.16 Incident and Accident

An Incident is a near miss, or, more nearly correct, a near hit. It has been described as a "lucky accident".

An Accident is, by definition, "an unplanned, unwanted event that disrupts the orderly flow of the work process. It involves the motion (energy) of people, objects, or substances. It is indicated by physical injury and/or property damage.

3.16.1 Incident Reporting

All incident related to the operation and maintenance of University shall be recorded, investigated and reported. An incident does not result in injury or property damaged. A hazard and exposure to the hazard must be present before an accident can occur. Remove the hazard and you remove the exposure and the accident

3.16.2 Accident Reporting

All accident involving fire, chemical spills, chemical exposure and any property damaged or injuries related to the operations and maintenance of University must be recorded, investigated and reported. This is to determine and document properly the cause of an incident or accident occurrence and to recommend and implement corrective and preventive actions.

Incident / Accident Report form is included in appendix 8 for proper reporting.

4.0 IMPLEMENTATION

4.1 Roles and Responsibility

The Business Operations Department and the Contractor for the operations and maintenance of Qatar University are the primary organization responsible to implement and maintain sound safety practices and that assure safety compliance in the operation and maintenance of Qatar University.

4.1.1 Business Operations Department Head

Department Head have the primary responsibility of directing and managing the Operations and Maintenance Workers Safety and therefore have responsibility for assuring sound safety practices and compliance at Qatar University.

4.1.2 Operations and Maintenance Contractor Head

The Head of the Operation and Maintenance contractor is responsible for compliance with safety regulations and good practices for the operations and maintenance at Qatar University.

4.1.3 Employees and Contractors

Employees and contractors are responsible for compliance with safety regulations and requirements in their work areas. They have the responsibility to complete required training prior to commencing their regulated or hazardous work and duties and perform inspections in their or work areas.

4.1.4 Business Operations Department – Safety Unit

Business Operation Department (BOD) Safety Unit is responsible for Operations and Maintenance Orientation/ Training at the beginning of each semester or as need arises to Business Operations Department employees. BOD – Safety Unit is also responsible for periodic workplace safety inspection. Refer to Appendix 10 for Safety Inspection Checklist.

4.2 Disciplinary Action for Noncompliance to Operations and Maintenance Workers Safety

A consequence for noncompliance to Operations and Maintenance Workers Safety is promulgated to uphold the University's values on excellence in everything we do, honesty, integrity, and respect for every individual. It also enables those comprising the University to work together as a cohesive and competent team deeply committed to duty and responsibility.

A disciplinary action shall be given for those who fail to implement and comply with Operations and Maintenance Workers Safety. The objective of disciplinary action is to change the erroneous performance, to deter others from similar actions and to maintain consistent, effective group standard. It should be clear that it is a particular performance that is being criticized and penalized; it is not personal attack on the individual.

The imposition of disciplinary action will depend on the gravity of the infraction. The penalties may be waived in favor of more severe penalty.

Appropriate administrators shall take disciplinary action to Operations and Maintenance employee and contractor who violate Operations and Maintenance Workers Safety guidelines. Disciplinary actions shall follow those procedures set forth by Human Resources and Administration of the University.

The recommended schedule of disciplinary action for noncompliance to Operations and Maintenance Workers Safety is attached in Appendix 8.

HAZARD ASSESSMENT MATRIX

HEALTH AND SAFETY RISK					
POINTS / FACTORS	1	2	3	4	5
PROBABILITY OF OCCURRENCE (P) (likelihood of occurrence/ recurrence)	Practically impossible	Possible but unlikely	Possible (Could occur, heard of happening)	Very probable (Has happened in the past)	Will happen (known to common or repeating occurrence)
SEVERITY OF RISK (S) (potential damage or injury)	Minor injuries/ very minor damage	Minor injuries requiring first aid/ minor damage	Injuries requiring medical treatment/ multiple damage	Extensive number of injuries/ reversible damage	Death and multiple injuries/ irreversible damage
Frequency (F) (how often or how frequent)	Once per year	Once in six months	Once per month	Once per week	Once per day or more
Exposure (E) (how often or how long is the exposure)	Rarely	Not often	Occasionally	Regular	Full Time
Number of person exposed (N)	Below 5	5 to 9	10 to 20	21 to 50	>50

NOTES:
Hazard with medium, high and extreme risks are considered significant.

RISK LEVEL		ACTION AND TIME SCALE
Below 10	Low Risk	Continuous implementation of mitigating measures
10 - 13	Medium Risk	Monitoring required to ensure existing controls are maintained. Implement additional mitigating measures, if necessary.
14 - 19	High Risk	Considerable resources may have to be allocated to reduce the impacts/risk. Where impacts/risk involves work in progress, **immediate** management action must be taken. Record the hazard and risk. Document corrective actions taken.
Above 20	Extreme Risk	Work should not be started until the impacts/ risk has been reduced. If it is not possible to reduce the impacts/risk even with limited resources, work has to remain prohibited. Record the hazard and risk. Document corrective action taken.

APPENDIX 2
Risk Assessment Form

STATE OF QATAR
QATAR UNIVERSITY
Business Operations Department

RISK ASSESSMENT FORM

Reference No.:

Room/ Area		Department:	
ACTIVITY			
A. HAZARDS			
B. WHO IS AT RISK			
C. ACTUAL AND POTENTIAL RISK			
C. EXISTING CONTROL MEASURES		RISK RATING	
		Probability of Occurrence Score (P)	
		Severity of Risk (S)	
		Freqency (F)	
		Exposure (E)	
		Number of Person Exposed (N)	
		Risk Rating (P+S+F+E+N)	
		Risk Level	
D. PROPOSED MITIGATING MEASURES			
E. Assessed by:		F. Reviewed by:	
Supervisor Date		Safety Officer Date	Section Head Date
F. Approved by: Department Head Date:			

STATE OF QATAR
QATAR UNIVERSITY

جامعة قطر
QATAR UNIVERSITY

RISK ASSESSMENT SUMMARY AND REVIEW DATES

Date: Revision No.: Reference No.:

Area: Department:

Risk Assessment No.	Assessor	Date Assessed	Review Date	Changes Yes/ No		Review Date	Changes Yes/ No		Review Date	Changes Yes/ No

APPENDIX 4
WORK EQUIPMENT ASSESSMENT

Reference No. _____

Equipment Description
Assessment No.: _____ Assessor: _____ Assessment Date: _____ Signature: _____

Suitability	YES	NO	Is Action Required		Action Taken
			YES	NO	
Is the equipment suitable for:					
The purpose for which it is intended?					
The location in which it is being used?					
Does the equipment itself pose any significant risks (fumes etc)?					
Maintenance / Use					
For maintenance purposes does the equipment require:					
A simple visual inspection?					
Portable electrical appliance test?					
Statutory inspection?					
Planned preventive maintenance?					
Maintenance log?					
Are there any specific risk that require the equipment to be:					
Used by authorized person only?					
Maintained by authorized person only?					

APPENDIX 4
WORK EQUIPMENT ASSESSMENT

Information, Instruction, Training & Supervision	YES	NO	Is Action Required		Action Taken
			YES	NO	
Have all the users been given use instruction?					
Verbal					
Written					
Is documentary evidence for the above available?					
Have all the users been given Health and Safety information?					
Verbal					
Written					
Is documentary evidence for the above available?					
Dangerous Parts					
Does the equipment present any specific hazards?					
If "yes" have adequate control measures been implemented?					
Does the equipment have any guards fitted?					
If "yes" are they inspected in a regular basis?					
Does the equipment present any risk from high or low temperature?					
If "yes" have adequate control measures been taken?					
Does the equipment require Personal Protective Equipment?					
If "yes" have the adequate control measures been under taken?					
Is the documentary evidence for the above available?					
Control Systems and Stop Measures					
Does the equipment have any control systems (start/stop buttons etc.)?					
If "yes" are they suitably marked?					
Does the equipment have an emergency stop?					
If "yes" is it suitably marked?					
Can the equipment be isolated from an energy source?					
If "yes" is the method of isolation accessible?					

APPENDIX 4
WORK EQUIPMENT ASSESSMENT

General Is the item of equipment stable?	YES	NO	Is Action Required		Action Taken
			YES	NO	
Is the lighting for the equipment adequate?					
Can the maintenance on the equipment be carried out without risk to health?					
Does the equipment require any specific warning signs other than those previously covered under the control section?					
Have all relevant Supervisor's been given use instructions?					
Verbal					
Written					
Is the documentary evidence for the above available?					
Have all relevant Supervisor's been given suitable and sufficient training?					
Verbal					
Written					
Is the documentary evidence for the above available?					
Defect Reporting					
Is there a written defect reporting system?					
If "yes" are defects signed off when complete?					
Is there a system for taking defected equipment out of service if the defect poses a risk to safety?					
Are equipment users aware of defect reporting system?					
Is the documentary evidence for the above available?					

APPENDIX 5
Lock Out/ Tag Out Permit

جامعة قطر
QATAR UNIVERSITY

LOCK OUT/TAG OUT PERMIT

SAFETY FIRST

Permit No. : _____
Date: : _____
Time : _____
W.R.. No. : _____

System / Equipment to be locked/ Tagged

_____
_____
_____

Job Description:

_____
_____
_____

Personnel Authorized to work under this permit:

1 _____ 3 _____
2 _____ 4 _____

Requested by:	**Date**	**Time**
_____	_____	_____
Concerned Personnel		

Request Granted by:

_____	_____	_____
QU Electrical Engineer		

Permit Inspected by:

_____	_____	_____
QU Safety Officer		

Release Requested by:

_____	_____	_____
Concerned Personnel		

Release Granted by:

_____	_____	_____
QU EE/ SO		

APPENDIX 6
Hot Work Permit

HOT WORK PERMIT

قطر جامعة QATAR UNIVERSITY

SAFETY FIRST

Permit No. :
Date: :

☐ NMPC
☐ Contractor

Requested by:

Name & Signature

Description of Work Area / Location:

Estimated duration of Work: From To

Date :
Time :

Description of Work:

Authorized Personnel:
1 2

Work Involved:
☐ Grinding ☐ Welding (Oxy&Acetylene)
☐ Cutting ☐ Others
☐ Welding (SMAW)

Work Safety Requirements & Protection Measures:
(To be filled up by Safety Engineer, in his absence the designated Safety Officer)

☐ Welding gloves	☐ Eye/Face Shield	☐ Safety Signs
☐ Welding spat	☐ Respirator	☐ Fire Extinguisher
☐ Welding leggings	☐ Bump Cap	☐ Screen
☐ Welding Apron	☐ Hard Hat	☐ Sealing of
☐ Knee pads	☐ Ear muff/ ear plug	☐ Partition of
☐ Safety Shoes	☐ Outing goggles	☐ Area to be cleared of
☐ Back support	☐ Cover-all	☐ Others

The hot work validity must be limited to one day only

Requirement before starting the work

1	Watchman to be informed	☐ Yes	☐ N/A
2	Department to be informed for implementing the hot work	☐ Yes	☐ N/A

Surveillance during and after the hot work

1	Permanent supervision for sparks	☐ Yes	☐ N/A
2	Presence of supervisor	☐ Yes	☐ N/A
3	Work to be stopped at_____h (2 hrs before plant closure)		
4	Location to be inspected 2 hours after completion of work, by		
5	In case item # 3 could not be followed due to emergency requirements, the Shift Engineer on duty or Maintenance Engineer shall be the one to supervise the work closely.		

Alarm

1 In case of fire , inform_____ Phone number_____
2 Sound the alarm by pushing the nearest alarm push button located in your work area.
3 Use the fire extinguisher available in your work area.

Permit Received by:

Contractor Safety Officer — Date/Time :

Safety Officer/ Leading Fireman — Date/Time :

Approved for Start of Work:

Contractor or Safety Officer — Date/Time :

Safety Officer/ Leading Fireman — Date/Time :

Work Completed — **Filed at Maintenance Dept**

Date: Date:
Time: Time:
By: By:

Apply Hot Work Permit for the next day

APPENDIX 7
Confined Space Entry Permit

جامعة قطر
QATAR UNIVERSITY

CONFINED SPACE ENTRY PERMIT

Date & Time Issued _____ Date & Time Expires _____
Job Supervisor _____
Equipment to be worked on _____
Work to be performed _____
Entrants _____
_____
Stand-by personnel _____

1. Atmospheric Checks
   - Time : _____
   - Oxygen, % : _____
   - Explosive, % LFL : _____
   - Toxic, ppm : _____

Tester Siganature _____

2. Source isolation (NO ENTRY) YES ☐ NO ☐ NA ☐
Pumps or lines blinded, disconnected or blocked

3. Ventillation Modification YES ☐ NO ☐ NA ☐

4. Atmospheric check after isolation and ventilation
   - Time : _____
   - Oxygen, %, > 19.5 % : _____
   - Explosive, % LFL < 10 % : _____
   - Toxic, PPM, < 10 PPM H2 : _____

Tester Signature _____

5. Communication procedures
_____
_____

6. Rescue procedures
_____
_____

7. Entry, Stand-by, Back-up persons
   - Training completed? YES ☐ NO ☐
   - Training current? YES ☐ NO ☐

8. Equipment	YES	NO	NA
8.1 Direct reading gas monitor tested?	☐	☐	☐
8.2 Safety harness/ lifelines for entrants/ stand-by crew?	☐	☐	☐
8.3 Hoist	☐	☐	☐
8.4 Powered communications?	☐	☐	☐
8.5 SCBA's for entrants and stand-by crew?	☐	☐	☐
8.6 Protective clothing?	☐	☐	☐
8.7 All electric equipment listed Class I, Div I, Group D and non-spark producing?	☐	☐	☐

10. Periodic atmospheric tests

Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %
Time: _____	O2, % _____	Explosive, % _____	Toxic, %

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any column is marked “no”. This permit is not valid unless all appropriate items are completed.

Permit prepared by: (Supervisor) _____ Printed Name _____ Signature

Reviewed by: (Safety Officer) _____ Printed Name _____ Signature

Approved by: (BOD-Safety Unit Head) _____ Printed Name _____ Signature

APPENDIX 8
Incident / Accident Report Form

STATE OF QATAR
QATAR UNIVERSITY

INCIDENT / ACCIDENT REPORT FORM

Section C: General Information	
Supervisor's Last Name	Supervisor's First Name
Department	Position
Telephone No.	Email
If there was a delay in reporting this event, list reason (s)	
Material Damage YES ☐ NO ☐ Approximate Value:	
Section D: Preventive Measure	
Cause of event – Root Causes (e.g. unsafe equipment, lack of training, etc)	
What corrective actions are being taken to prevent recurrence?	
Frequency of the task or activity that led to the event: ☐ Often (daily or weekly) ☐ Occasionally (monthly) ☐ rare (1-4 times per year)	
Has a risk assessment been carried out for the process/ activity	YES ☐ NO ☐
Have person (s) involved receive training or instruction in the work or activity being carried out?	YES ☐ NO ☐
Was there any supervisor of the work being carried out?	YES ☐ NO ☐
Supervisor's Comment (Additional information on event)	
If injury occurred, please check one ☐ No First Aid administered, returned to work ☐ First Aid administered, returned to work ☐ Saw a physician, return to work ☐ Saw a physician, reurned to light duty ☐ Saw a physicam, time loss ☐ Refused medical treatment	

Safety Committee Use only

Reviewed by:	Date
Distribution ☐ Department ☐ HR ☐ Operations and Maintenance Contractor Head	
Follow up ☐ Supervisor ☐ Department Head ☐ Others _____	

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
1	Hazard Management	➢ Is the hazard identified in the workplace?			
		➢ Is Risk Assessment conducted after hazard identification?			
		➢ Control measure implemented?			
2	Personal Protective Equipment	➢ Are the workers use PPE's as needed?			
		➢ Are PPEs comply with international standard?			
		➢ Are the PPE's replace upon damaged?			
3	Electrical Safety	➢ Are equipment and electronic systems conforms to the National Electric Code, National Fire Protection Association Code or state electrical code?			
		➢ Are wiring of equipment damaged or frayed?			
		➢ Are personnel knew the location and how to operate shut-off switches and/or circuit breaker panels?			
		➢ Is extension cords use only for temporary operations or for short periods of time?			
		➢ Are multi-plug adapters having circuit breakers or fuses?			
		➢ Are exposed electrical conductors place behind shields?			
		➢ Is there a chemical spills on or near electrical equipment?			
4	Insulation	➢ Are electrical cords having sufficient insulation?			
		➢ Is the damaged cords repaired or taken out of service?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
5	Guarding	➢ Electric equipment operating at 50 volts or more guarded against accidental contact?			
6	Grounding	➢ Is the equipment with three-prong plugs use in the laboratory having grounding?			
7	Circuit Protection Devices	➢ Is circuit protection devices are automatically limits or shut off?			
8	Motors	➢ Are motor-driven electrical equipments equipped with non-sparking induction motors or air motors?			
		➢ Are motors the meet National Electric Safety Code Class 1, Division 2, Group C-D explosion resistance specifications?			
		➢ Is the power source disconnected before servicing or repairing electrical equipment?			
		➢ Is nonconductive gloves and shoes with insulated soles wear and hands are dry when handling equipment that is plug in?			
		➢ Is work handle properly from all conductive material?			
		➢ Is the use of electrical equipment in cold rooms or other areas where condensation is likely to occur is minimized?			
		➢ Is the equipment use in the cold room was mounting on a wall or vertical panel.			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
9	Motors	➢ Is the power shut off at the main switch or circuit breaker and the equipment is unplug if water or a chemical is spilled onto equipment?			
		➢ Is the power switch off when not in use?			
		➢ Are there known hazards post such as "high voltage", "high temperature", "possible shock", "wear protective equipment", etc.?			
		➢ Is the repairs of high voltage or high current equipment, performed only by trained electricians			
10	Altering Building Wiring and Utilities	➢ Are the modifications to existing electrical service in a laboratory or building approved by Business Operation Department?			
11	Lock Out Tag Out	➢ Is the lock out/ tag out system implemented? ➢ Are the personnel using the lock out/ tag out have proper training? ➢ Is the re-training conducted? How often? ➢ Are the lock out / tag out devices properly used?			
12	Hot Work Permit	➢ Is the hot work permit system being implemented? ➢ Is the authorized person have sufficient technical knowledge, training and practical experience in the hot work process? ➢ Is the employee performing the hot work have proper orientation/ training?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
12	Hot Work Permit	➢ Is there person designated as fire watch properly trained on what to do in case of emergency? ➢ Is the hot work permit completed prior to initiating the hot work job? ➢ Is the hot work permit approved by the authorized persons? ➢ Is there available fire suppression during hot work?			
12	Safe Lifting and Back Safety	➢ Are the workers follow the proper safe lifting methods to prevent injury during lifting of materials?			
13	Use of Scaffolding	➢ Is the guidelines for the proper use of scaffolding implemented? ➢ Are the scaffolds remove from service or replace when damaged?			
14	Use of Stairways and Ladders	➢ Is the guidelines for the proper use of stairways and ladders implemented? ➢ Are the ladders remove from service or replace when damaged?			
15	Walking and Working Surfaces, Floor Openings	➢ Is the guidelines for walking-working and floor openings implemented?			
16	Use of Hand and Power Tools	➢ Is the guidelines for the use of hand and power tools implemented?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
17	Welding and Cutting Materials	➢ Is the guidelines for welding and cutting materials implemented?			
18	Heat Stress	➢ Are the preventive control to minimized exposure to heat used? ➢ Are heat alert being issued to employees during conditions that contribute to heat stress?			
19	Confined Space	➢ Is the guidelines during work in a confined space implemented? ➢ Are the authorized personnel to perform work in a confined space have proper orientation/ training? ➢ Are safety signs for confined space work available?			
20	Fire Safety	Fire Safety Management			
		➢ Have the means to control the risk and protection of people in the event of the fire have been carried out?			
		➢ Have staffs been suitably trained for these measures?			
		➢ Is there suitable monitoring of fire safety measures in place?			
		➢ Can it be demonstrated that monitoring is regularly carried out?			
		Fire Prevention - General			
		➢ Are smoking areas properly marked and used?			
		Fire Prevention – General			
		➢ Are all employees in high risk properly informed of the particular risks and the means to control these risks?			
		➢ Prior to leaving the premises, are all areas inspected for potential fire and unnecessary equipment turned off?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
20	Fire Safety	➢ Have all staffs received basic fire prevention instruction?			
		➢ Do staffs understand the role of self-closing and other fire-resisting doors – the need to keep them closed and free of obstruction to ensure that they will control the spread of fire and smoke?			
		Fire Prevention – Electrical Safety			
		➢ Are staffs aware that only trained personnel authorized by management can repairs or alterations to electrical systems and equipment?			
		Fire Prevention – Heating Appliances			
		➢ Are appropriately qualified and registered contractors used to carry out all installation and maintenance of liquid or gaseous gel supply equipment?			
		➢ Are staffs aware that only trained personnel authorized by management can make repairs or alterations to liquid or gaseous fuel-fired equipment and fuel supply systems?			
		Fire Prevention - Buildings			
		➢ Are all fire and smoke barriers in good condition with any openings for pipe ducts, etc. properly protected by provision of fire-resisting materials or fire dampers?			
		Fire Prevention – Buildings			
		➢ Are fire dampers tested regularly for correct operations and results recorded?			
		➢ Are there proper systems and procedures in place to control work on alterations, repairs and decoration of premises, such that no fire hazards are introduced?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
20	Fire Safety	➢ Are regular checks undertaken and recorded off the condition of all fire safety measures within the premises?			
		Fire Prevention – Means of Escape			
		➢ Are fire exits of a sufficient number and of sufficient width to enable the people present in any and all areas to evacuate safely?			
		➢ Do all final exits lead to a place of total safety?			
		➢ Are all fire exits readily available?			
		➢ Are all final exits and intermediate doors easily operable from the inside without the use of a key?			
		➢ Are all corridors, gangways and stairways forming part of escape routes free from obstruction and not used for storage?			
		➢ Are floor and stairways surfaces in good condition and free from tripping and slipping hazards particularly including any external stairs and paths?			
		➢ Are fire-resisting and smoke-stop doors in good condition, with fully operating self-closing devices and the doors closing fully onto rebates?			
		Fire Prevention – Means of Escape			
		➢ Do all doors on escape routes open in the direction of travel?			
		➢ Are all escape routes clearly and properly signed throughout their lengths, with internal doors not forming part of a route clearly labeled as such?			
		➢ Are all escape routes provided with adequate lightings at all times of the day and night?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
20	Fire Safety	➢ Is adequate emergency lighting provided and is it fully serviceable?			
		➢ Have appropriate provisions been made for the safety of persons with special needs, such as young, old and disabled?			
		Fire Prevention – Action in the Event of Fire			
		➢ Are there clearly defined written fire action and emergency evacuation procedures, including provision for ensuring that everyone is out of the building?			
		➢ Are all employees fully aware of these procedures and their own particular duties and responsibilities in the event of an evacuation?			
		➢ Are suitable "Fire Action" notices prominently displayed around the premises?			
		➢ Have appropriate staffs been appointed to take control in the event of fire (Fire Marshal) and to summon the fire brigade for all fires, no matter how small?			
		➢ Are there sufficient fire responders available to provide for all working hours (including lunch and tea breaks), taking into account holidays and sick live			
		➢ Have appropriate arrangements been made for dealing with those who are not normally on the premises such as members of the public, visitors and contractors?			
		➢ Are the fire evacuation assembly areas in safe locations, clear of the building and away from fire brigade vehicle access and parking?			

APPENDIX 9
Safety Inspection Checklist

Item #	Particular	Checklist	Compliance		
			Yes	No	N/A
20	Fire Safety	➢ Are there alternative evacuation areas available in the event that the nominated ones are not available?			
		➢ Are emergency evacuation routes and procedures checked by carrying out drills at least once per year?			
21	Emergency Preparedness and Response	➢ Do you know what to do in case of fire?			
		➢ Do you have emergency telephone numbers posted?			
		➢ Do you know how to use the Fire Extinguisher?			
		➢ Do you have push button fire alarm?			
		➢ Do you know what to do in-case there is an injured persons in your area?			

APPENDIX 10
Schedule of Disciplinary Actions

The disciplinary action for noncompliance to Operation and Maintenance Workers Safety is categorized as follows:

1. Very Minor Injury/ Illness/ Damage to Property - Unsafe act or condition that has a very little effect on employee safety, health or property; a first aid only incident with less that 30 minutes off work.

2. Minor Injury/ Illness/ Damage to Property - Unsafe act or condition that may result in either the employee being unable to undertake normal duties for 5 days, no significant property damage.

3. Major Injury/Illness/ Damage to Property – Unsafe act or condition that may cause severe injury, permanent partial loss of one or more bodily functions, severe illness or with property damage. Requires 2 weeks - 4 months off work.

CODE	DISCIPLINARY ACTION
A	➢ Counseling with documentation to the employee or contractor, plus a notation or copy of the document to employee or contractor personal file. ➢ Copy shall be given to Department Head or Operations and Maintenance Contractor Head/ Representative.
B	➢ Written warning to the employee or contractor, plus a notation or copy of the warning filed in the employee or contractor personnel file. ➢ Copy shall be given to Department Head or Operations and Maintenance Contractor Head/ Representative.
C	➢ Time Off Without Pay shall be recommended to the employee or contractor for repeated and/or more serious violation but not serious enough for termination. The number of days is indicated after the code ➢ Copy of the document recommending for Time Off Without Pay shall be given to Department Head or Operations and Maintenance Contractor Head/ Representative.
D	➢ Termination from service shall be recommended to the employee or contractor for very serious violation and /or totally unsatisfactory performance. ➢ Copy of the document recommending for Discharge shall be given to Department Head or Operations and Maintenance Contractor Head/ Representative.

APPENDIX 10
Schedule of Disciplinary Actions

1.0 Very Minor Injury/ Illness/ Damage to Property

Violation/ Infraction		Disciplinary Action			
		1st Offense	2nd Offense	3rd Offense	4th Offense
1.0	Failure to safe keep personal protective equipment	A	B	C1	C2
2.0	Failure to comply with the proper posting of safety signs	A	B	C1	C2
3.0	Failure to seriously participate during emergency preparedness and response drill	A	B	C1	C2
4.0	Failure to implement good housekeeping in the workplace.	A	B	C1	C2

2.0 Minor Injury/ Illness/ Damage to University Property

Violation/ Infraction		Disciplinary Action			
		1st Offense	2nd Offense	3rd Offense	4th Offense
1.0	Failure to comply Electrical Safety with no significant damage to University property	B	C2	C4	C6
2.0	Failure to comply with Lock Out Tag Out System with no significant damage to University property	B	C2	C4	C6
3.0	Failure to comply with Hot Work System with no significant damage to University property	B	C2	C4	C6
4.0	Failure to comply with safe lifting with no significant damage to University property.	B	C2	C4	C6
5.0	Failure to comply with back safety with minor injury.	B	C2	C4	C6

APPENDIX 10
Schedule of Disciplinary Actions

2.0 Minor Injury/ Illness/ Damage to University Property

Violation/ Infraction		Disciplinary Action			
		1st Offense	2nd Offense	3rd Offense	4th Offense
6.0	Failure to comply with the proper use of scaffolding with no significant damage to University property.	B	C2	C4	C6
7.0	Failure to comply with the proper use of stairways and ladders with no significant damage to University property.	B	C2	C4	C6
8.0	Failure to comply with safe walking-working surfaces.	B	C2	C4	C6
9.0	Failure to comply with the proper use of hand and power tools with no significant damage to University property.	B	C2	C4	C6
10.0	Failure to comply with the proper use of welding and cutting with no significant damage to University property.	B	C2	C4	C6
11.0	Failure to comply with heat stress guidelines.	B	C2	C4	C6
12.0	Failure to comply with confined space guidelines with no significant damage to University property.	B	C2	C4	C6
13.0	Failure to comply with the "No Smoking" policy.	B	C2	C4	C6
14.0	Failure to use personal protective equipment during work.	B	C2	C4	C6
15.0	Failure to report accident/ incident.	B	C2	C4	C6
5.0	Failure to comply wearing of personal protective equipment as required.	B	C2	C4	C6

APPENDIX 10
Schedule of Disciplinary Actions

3.0 Major Injury/Injury/ Damage to University Property

Violation/ Infraction		Disciplinary Action			
		1st Offense	2nd Offense	3rd Offense	4th Offense
1.0	Failure to comply Electrical Safety with minimal damage to property.	C2	C4	C6	D
2.0	Failure to comply with Lock Out Tag Out System with minimal damage to University property	C2	C4	C6	D
3.0	Failure to comply with Hot Work System with minimal damage to University property	C2	C4	C6	D
4.0	Failure to comply with safe lifting with minimal damage to University property.	C2	C4	C6	D
5.0	Failure to comply with the proper use of scaffolding with minimal damage.	C2	C4	C6	D
6.0	Failure to comply with the proper use of stairways and ladders with minimal damage to University property.	C2	C4	C6	D
7.0	Failure to comply with the proper use of hand and power tools with minimal damage to University property.	C2	C4	C6	D
8.0	Failure to comply with the proper use of welding and cutting with minor damage to University property.	C2	C4	C6	D
9.0	Failure to comply with confined space guidelines with minimal damage to University property.	C2	C4	C6	D
10.0	Failure to comply Electrical Safety with major damage to property	D			

APPENDIX 10
Schedule of Disciplinary Actions

3.0 Major Injury/Injury/ Damage to University Property

Violation/ Infraction		Disciplinary Action			
		1st Offense	2nd Offense	3rd Offense	4th Offense
11.0	Failure to comply with Lock Out Tag Out System with major damage to University property	D			
12.0	Failure to comply with Hot Work System with major damage to University property	D			
13.0	Failure to comply with safe lifting with major damage to University property.	D			
14.0	Failure to comply with the proper use of scaffolding with major damage to University property.	D			
15.0	Failure to comply with the proper use of hand and power tools with major damage to University property.	D			
16.0	Failure to comply with the proper use of stairways and ladders with major damage to University property.	D			
17.0	Failure to comply with back safety with major injury.	D			
18.0	Failure to comply with the proper use of welding and cutting with major damage to University property.	D			
19.0	Failure to comply with confined space guidelines with major injury.	D			

APPENDIX 11

Emergency Telephone Number

S N	STATION / OFFICE	TELEPHONE NUMBERS
1	Business Operations Dept. –CSU Control Room	4403 3600
2	Fire Section	4403 3999
3	Security	4403 3566/ 4403 3564 / 4403 6161
4	Safety Unit	4403 3528 / 4403 3581
5	Medical Clinic	4403 3294 / 4403 5050
6	Qatar Emergency Line (Police, Fire, and Ambulance)	999
7	Qatar University Disposal and Chemical Waste (PLWALPA CO.)	5586 8573
8	Hamad Hospital – Accident and Emergency	4439 2111
9	Ministry of Environment	4420 7777